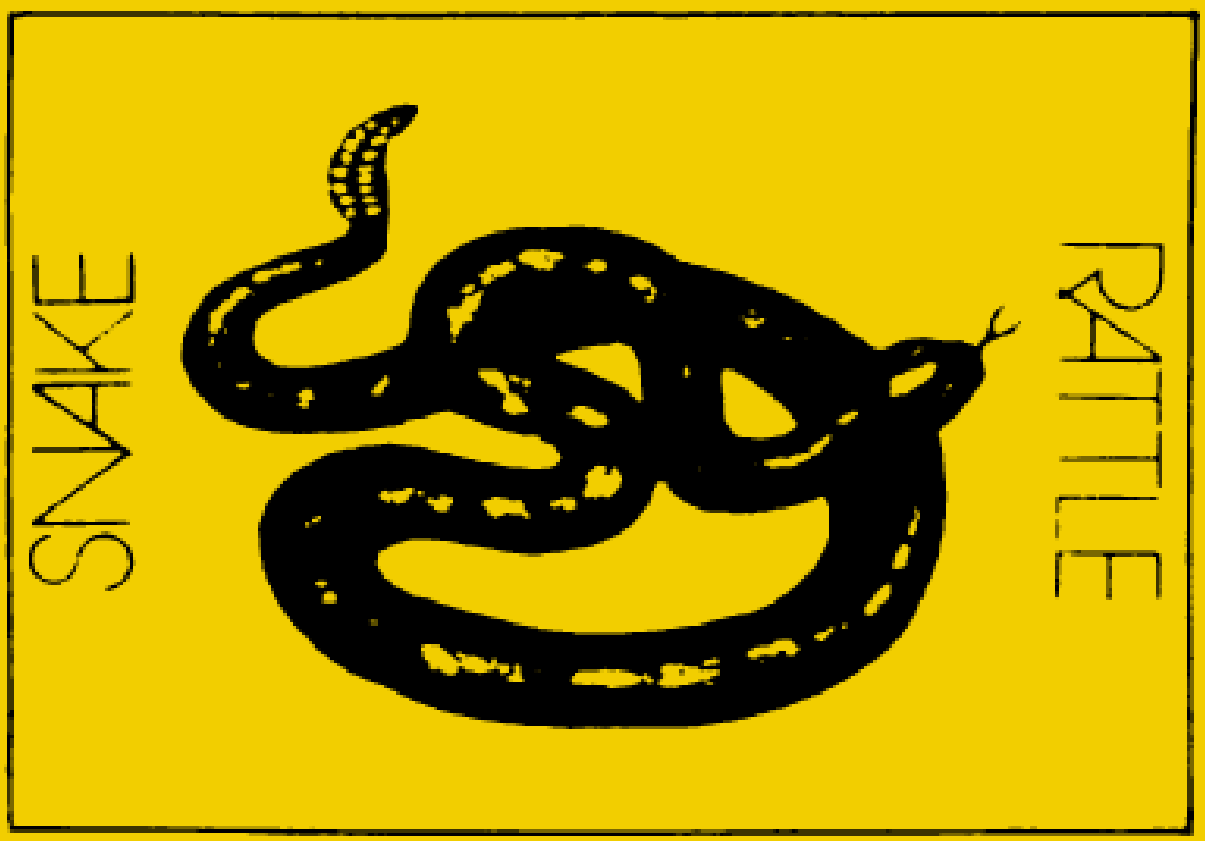
Prevention of Tropical Diseases

L.S. Yarotsky



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Л. С. Ярощкий

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Contents

Foreword

Tropical diseases are those diseases primarily or exclusively found in countries with a warm climate. Climatic, working, and living conditions, flora and fauna, diet, and habitat are all factors in the development of various diseases specific to the tropics. Because of these tropical diseases, residence in the tropics was until recently considered risky for people. Now the situation has changed considerably. Thousands of Europeans live and work in the tropics and return to their own countries in good health. This has become possible because advancements in medicine have provided doctors with the means for prevention and treatment of a number of tropical diseases. It would be a mistake, however, to underestimate the significance of seemingly minor aspects of personal hygiene (care of the skin, proper clothing, sufficient liquid intake, and so on) in the prevention of disease and the protection of individual health.

The purpose of this publication is to inform people travelling to the tropics of the latest methods in the prevention of the most widespread tropical diseases. These methods include protection from insects, poisonous animals, and plants, as well as measures to ensure proper living and working conditions and personal hygiene.

In the tropics, particularly in the developing countries, public health authorities are simply unable, as yet, to provide the population with all the necessary medical care. Thus people travelling to the tropics should be aware of the recommended medical practices for life in the tropics and observe them strictly.

Tropical diseases are either noninfectious (caused by specific climatic conditions or by poisonous plants and animals) or infectious. The infectious diseases may be common to other climates as well as to the tropics or may be specific to the tropics. This publication deals mainly with the prevention of diseases that are unfamiliar to newcomers to the tropics and that, therefore, present the greatest danger to their health.

Preventive measures include four stages:

1. Preparation for life and work in the tropics must begin before the traveller leaves home (looking through the relevant medical literature, medical examination, inoculations, preparation of suitable clothing, a first-aid kit, and so on).

2. Shortly after arrival, it is necessary to visit the local doctor who can supply detailed information about the local conditions and who will be responsible for the health of the new arrivals during their stay.

3. Throughout the stay in the tropics, it is important to follow strictly the medical recommendations concern-

ing personal hygiene, working conditions, diet, sleeping habits, clothing, habitat, and everyday life.

4. On returning home it is necessary to undergo a complete medical examination and obtain necessary advice on easing the process of reacclimatization.

Long-term experience has proved that careful observation of the rules of hygiene helps ensure health, fitness, and good spirits in the tropics, as well as a safe return home.

General Information About Tropics

Climatic and socio-economic conditions in the tropics differ considerably from those in the temperate regions. Characteristics of the tropical climate are: high air temperatures with only slight fluctuations during the day, high humidity, high-level solar radiation, two seasons of the year rather than four (the dry, summer season and the rainy, winter season), seasonal regularities in the air currents (winds). These climatic peculiarities cause the high occurrence of such illnesses as heat and sun stroke, sun burn, prickly heat, and so on in the tropics.

Unique and diverse flora and fauna have developed in the warm and humid tropical climate. Many of the insects, poisonous animals, and plants found in the tropics are the sources or carriers of infectious and noninfectious diseases that are not encountered in more temperate climates. A considerable variety of pathogenic organisms (viruses, bacteria, fungi, parasitic worms (helminths), and so on) exist in the tropics, and these pathogens multiply quickly and thrive in the warm, humid air and favourable environment (the soil, reservoirs, and plants).

Certain socio-economic factors in the tropical countries are also conducive to the spread of disease among the population there. These include malnutrition, inadequate public health education, poorly developed public health service, inadequate medical care for the poor, certain conditions of everyday life (migrations, customs, rituals, and so on). The above-mentioned natural and social factors determine the epidemiological situation in the tropics and its potential danger.

Conditions in different regions vary widely throughout the tropics as a whole, however, and may even vary within a single country. As a rule, the climate of hilly and mountain regions is more favourable to live in than that of the low lands. Diseases transmitted by insects are more common in the countryside than in the towns. Medical service is better organized in the cities (particularly, in the capital cities) than in the villages. People working in the jungle are more frequently injured by poisonous insects and animals than those working in the offices. Conditions in countries with a relatively high level of socio-economic development and, therefore, vast cultivated territories are more favourable for both the local population and recent immigrants than conditions in countries just embarking on the path of development and independence.

Thus, the degree of risk to the health varies. Protective measures must be rationally planned and carried out in accordance with existing conditions in a specific country or region.

Getting Ready to Leave for the Tropics

Individuals leaving for the tropics should first undergo a medical examination to make certain they are not suffering from diseases that will aggravate their stay in the tropics. At the same time they should ask their doctor for general advice on life in the tropics. The doctor should be made aware of past or chronic illnesses (e. g., gastric and duodenal ulcer, psychic and nervous disorders, inflammation of the middle ear, fungus skin diseases, diseases of the joints, certain gynaecological diseases, allergy, and others) that may recur in the tropics. This is especially important when a long-term stay is planned in a remote region without qualified medical service or adequate means of transportation to the nearest hospital. In each case the doctor will consider the patient's physical condition, the region of the tropics, and the nature of the work to be performed before advising the patient on the most suitable life-style.

All dental work should be completed before departure. People who wear eyeglasses should take an extra pair with them. The list of medicines recommended for the individual first-aid kit is contained in Appendix 2.

Prevention of Climate-Related Diseases

The more the new climatic conditions differ from those one is used to, the more difficult acclimatization proves to be. Acclimatization is defined as the process of reorganization of the physiological functions of the organism to adapt to new environmental factors. Adaptation to the new climate is either imperceptible or is accompanied by increased perspiration, undue fatiguability, disturbed sleeping, appetite, drinking or similar symptoms. Acclimatization depends on the individual features, age, and sex, as well as on the character of the work, the season of arrival, and the climatic conditions in the region.

Healthy individuals used to a temperate climate have difficulty, at first, adjusting to the tropical heat. In a few weeks, however, most of them become acclimatized. Persons travelling to the tropics by ship acclimatize, to a certain degree, during the voyage. Children acclimatize more easily than adults. Even people coming to the tropics for a short stay (two to three weeks) must spend their first day in the tropics resting.

Since some people take longer to acclimatize than

others because of certain individual traits or diseases, measures must sometimes be taken to improve the health of the newcomer and to build up the organism's resistance to the tropical climate (usually by rest, improved working conditions, medical treatment). But an acclimatized organism is still susceptible to the influence of separate climatic factors (the heat and sun, for example); therefore, protection from the harmful effect of the environment must be provided throughout the stay in the tropics.

DISTURBANCES IN THE WATER-SALT METABOLISM

On hot days loss of salt and water with perspiration affects the delicate balance of salt and water in the organism. Minor losses of salt and water cause fatigue, headaches, and dizziness. Considerable changes in the water-salt balance are likely to cause, within a few hours or days, fainting, pallor, and vomiting, cold and clammy sweat. Persons suffering from this condition are advised to drink salted water and fruit juices for several days. If the case is serious, a doctor must be consulted. First aid consists of giving a salt enema (two teaspoonfuls of salt per litre of water).

The proper balance of salt and water can be maintained by drinking sufficient quantities of liquids (three or more litres of water a day during the dry season) and eating slightly oversalted food. Persons engaged in heavy physical labour or sports activities need still more water and salt; their water must be salted (four teaspoonfuls of salt per one litre of water). Drinks must be taken fre-

quently and regularly. It is not advisable to drink too much salted water at one time or to let long intervals pass between drinks.

To ensure proper water-salt metabolism, especially during the dry season, a doctor must be consulted.

HEAT STROKE

When the body becomes overheated, the thermoregulation of the organism is disturbed, and a heat stroke may occur. The first signs of a heat stroke are pain in the extremities, thirst, drowsiness, dizziness, headache, decreased perspiration or the absence of perspiration, and, occasionally, nausea and vomiting. More serious symptoms develop if medical aid is not administered immediately: mental fog, coma (with or without convulsions), elevated body temperatures (between 40 and 42°C). A heat stroke is more severe if alcohol was taken not long before the stroke.

Since heat strokes can be very serious, first aid must be offered as quickly as possible. The victim should be undressed and placed in a cool, air-conditioned room. The air stream from the fan or air conditioner should be directed at the victim while he is sponged with a damp towel until the body temperature drops to 39°C. The victim is then put to bed and covered with a light blanket. The body temperature should be checked frequently; if the temperature rises, cold sponging must be resumed. Heat strokes can be prevented by measures directed against overheating: protection from the heat and the sun's insolation, proper liquid intake, and so on.

SUNBURNS

The skin of fair-haired individuals is more susceptible to the sun's ultraviolet rays than the skin of dark-haired, dark-complexioned people. A suntan from brief sunbaths of several minutes' duration enhances the skin's resistance to prickly heat (tropical miliaria), fungus infections, and other skin diseases widespread in the tropics. Excessive skin irradiation by the sun may cause burns of various degrees, ranging from slight reddening to vast lesions in the form of blisters filled with watery fluid. In the tropics excessive daily sun irradiation of the skin (especially the neck) causes chronic dermatitis ("sailor's skin"). In addition, small warty growths may appear on the face and on the backs of the hands.

The main prophylactic measures include the use of creams to soften the skin, the application of sunscreen preparations, proper clothing, and a suitable schedule of work and rest.

PRICKLY HEAT

Changes in the body's perspiration may cause various skin diseases. Prickly heat (tropical miliaria) is one of the most widespread diseases among newcomers to the tropics, especially among small children and stout women. Minute blisters appear on the portions of the skin where aeration is inadequate (in the skin folds and where the clothes fit tightly). People predisposed to miliaria must limit their consumption of liquids and avoid heavy physical work, which causes excessive perspiration.

The irritating symptoms (itching, interrupted sleep) can be eased by airing and drying the skin. Loose cotton

and linen clothes are recommended. Children must wear socks, shoes, and panama hats. Newborns must not be swaddled tightly. In the hot and humid tropical climate, it is also helpful to use the air conditioner at night. Cool showers without soap are also recommended; the skin should be thoroughly dried and dusted with talc or a similar powder. Powders of talc, zinc oxide, and boric acid for the prevention or treatment of prickly heat possess astringent and antiseptic (antimicrobial) properties. When prickly heat is complicated by an infection, medical service must be sought.

Prevention of Nervous and Psychic Disorders

Although life in the tropics considerably affects the nervous system of all newcomers, various people react differently to the new climate, geography, local customs, and traditions. Mentally-unbalanced individuals or those with a history of nervous disorders are not advised to stay in the tropics for a long period. Heat and excessive humidity aggravate nervous and psychic disorders and result in irritability, poor sleeping, home sickness, loss of appetite or weight, and so forth, which lead to a weakened general condition.

Good working and living conditions, uninterrupted sleep, regular visits home, and properly organized leisure and sports activities can help prevent psychic disorders.

Poisonous Animals and Plants

Poisonous plants and animals are found nearly everywhere, but people suffer from them more in the tropics than elsewhere. Exposure to poisonous plants and animals is very wide in the countryside, although the residents of well-built, modern cities are also subject to daily contact with annoying and harmful poisonous insects. Since certain poisonous plants and animals cause lesions that require immediate treatment, people leaving for the tropics must be familiar with the effects and treatment of various venoms and vegetable poisons.

AMPHIBIA

Some species of tropical frogs and toads (*Dendrobates spp vovoa*, African tree frog) are dangerous, especially for children. When poisonous secretions produced by the glands of these animals come into contact with the skin or the mucous membranes of the mouth, nose, and eyes, they cause severe irritation, pain, watering of the eyes, and sneezing. Children should be kept away from these amphibia.

Fig. 1. Rattle snake

SNAKES

About 270 species of poisonous snakes are found in the tropics and subtropics: about 75 species in Africa, 165 species in Asia and Malay Archipelago, 91 species in America (mostly in South America), 80 species in Australia, and 8 species in Europe (Sultanov, M., 1963).

Fields and jungles are the natural habitat of snakes but they can also be found in villages, large cities, and even in apartment houses and other buildings. They feed on animals, most species preying at night.

The most dangerous poisonous snakes in the tropics are the cobra, bushmaster, fer-de-lance, mamba, *Ancistrodon sp.*, black snake, coral snake, South American rattle snake (Fig. 1), krait, daboia, *Bungarus fasciatis*, Rus-

sell's viper, tic-polonga, green tree snake, copperhead snake, *Doliophis intestinalis*, and others. The most dangerous sea snakes are the pelamyd and *Hydrophinals sp.* (Talysin, F., 1970).

All snakes can swim. They normally seek shelter when disturbed and attack man only in self-defence, when stepped on or touched accidentally. The snake's crawling speed is not more than seven or eight kilometres per hour, but snakes bit swiftly, mostly in the shin or foot.

Although newcomers to the tropics rarely become the victims of snake bites, it is, nevertheless, necessary to find out from the local doctor upon arrival what species of snakes are found in the locality. This information is important in choosing the correct antivenous serum since the type of serum depends on the species of snake involved. First aid to the victim involves:

1. Removal of the venom from the location of the bite.
2. Intake of abundant fluids (tea, coffee, water).
3. Subcutaneous or intravenous injection of the specific antidotal serum.
4. Transfer of the patient to the hospital.

Even when the area around the bite is not painful and the victim's general condition is good, medical assistance must be rendered without delay. The poison is removed by washing the wound with water. The victim must avoid jerky movements, which quicken the penetration of poison into the tissues and its circulation in the blood. The limb with the bite should be immobilized as in the case of a fracture and, if possible, is suspended during transportation. The victim should be given anaesthetics (aspirin or pyramidon) to abolish the sensation of pain. To alleviate nervous shock and fear of death, it is

important to assure the victim that the bite is not fatal. If the victim is shivering he should be given warm tea and wrapped with blankets.

If possible the snake should be killed and identified. Once the species has been identified, specific monovalent serum, which neutralizes the particular snake poison, is injected. If the snake cannot be identified, polyvalent serum, with protective properties against the poison of several species of snakes common to the given locality, is injected. The most effective method of saving the victim's life is timely injection of serum in sufficient quantities. Even in severe cases of snake bite, which involve paralysis of the respiratory muscles, immediate injection of the antidotal serum may save the victim. When the wound from the snake bite is contaminated or the poison causes skin blisters, antitetanic serum must also be injected.

Certain species of cobra spit venom into the eyes of their victims with remarkable accuracy. The venom causes acute pain and inflammation of the mucous membranes of the eyes, which must be immediately washed with water or milk.

Formerly, snake bites were treated by applying a band to the limb, cauterizing the wound with a burning hot object, potassium permanganate, or acids, making incisions at the site of the wound, and sucking the blood and poison from the wound. This time-honoured method is not recommended. It achieves little since the poison spreads quickly through the body with the blood. The method, as a rule, complicates the healing process of the affected limb and may even be the cause of amputation. The victim must not be given morphine derivatives or alcoholic drinks.

Fig. 2. *Physalia physalis*

In regions where the threat of snake bite is high, it is necessary to wear high boots or sturdy shoes with leggings or thick woollen socks. One must also be careful when working in areas where snakes are most likely to dwell. A flashlight should be used after dark even in cities.

Medical aid stations should always keep in store monovalent or polyvalent antivenin sera effective against the local snake species. The sera must be kept fresh and stored in the refrigerator, complete with syringes. Specia-

lists working in agricultural areas (forest managers, agronomists, road builders, and others) must keep antidotal sera at hand and know how to inject it.

JELLYFISH

Poisonous jellyfishes (*Cordonemus vertens vertens*, *Physalia physalis* (Fig. 2), *Cyanea arctica*, sea-wasp jellyfish, and others) cause severe pain at the point of contact with the skin, as well as oedema, pain in the nearest lymphatic nodes (the groin nodes or the axillary nodes), laboured respiration, fright, and anxiety. The pain and oedema decrease in a few hours while the patient's general condition improves within a day or two.

Treatment includes anaesthetic ointments and diphenylhydramine hydrochloride. The patient should also drink plenty of fluids. Severe cases may require hospitalization. Contact with jellyfish (swimming or bathing where they are numerous) is to be avoided.

MOLLUSCS

Molluscs with venomous glands are found in the coastal waters of Australia, Iran, India, and other countries. The Conus (*Gastropods*) may injure the skin of the hands with a proboscis that can be swiftly thrust out of its beautiful, particoloured shell. Poison is simultaneously injected into the wound. The affected area grows red; acute pain, oedema, and numbness may develop. Children may lose consciousness, develop a rapid pulse, experience laboured breathing, dyspnea or paralysis.

Other dangerous species of molluscs include octopuses and oysters. Octopuses exude poisonous saliva in the wound when they bite. Oysters, if eaten during the period

of their maturation, can cause hives, intestinal disorders, and vomiting.

SEA URCHINS

Tropical sea urchins, although they possess highly poisonous spines, rarely affect man. The prick of a spine can cause a wound that heals slowly. Sometimes symptoms of general intoxication are observed (headache, nausea, vomiting). Sea urchins may be caught in fishermen's nets. They should not be touched with bare hands.

LEECHES

Many species of leeches live in the warm waters of tropical rivers and swamps or are found on plants and soil. Leeches can adhere to the skin or get into the digestive or respiratory organs when water from infested reservoirs is used for drinking. Leeches' bites are painless but the wound may bleed or become septic. An attached leech must never be forcibly pulled off the skin because it might leave behind its sucking disk which causes suppuration or inflammation. Instead, the leech should be removed by searing it with a match or vinegar, salted water, eau de cologne, or alcohol. The wound must be treated with iodine and dressed with a sterile bandage. Leeches in the respiratory tract should be surgically removed.

People working in reservoirs should wear high rubber boots and trousers for protection against leeches. Swimming or bathing in reservoirs infested with leeches is not recommended and drinking water must be checked to make sure it is not infested. Dimethylphthalate, indalon, or some other suitable repellent should be applied to the

Fig. 3. Sting ray

skin, and socks, footwear, and clothing should also be impregnated with the repellent.

FISHES

Many species of fish in the tropical oceans, seas, lakes, and rivers are poisonous, with venom glands in their spiny fin rays, superimposed cranial bones, or tail spines. Other species, even though they do not possess venom glands, are unsuitable as food because of their toxic internal organs (liver, roe, milt), which may cause severe poisoning. The most dangerous poisonous fishes are the following:

(1) the sting ray (Fig. 3) (the Atlantic, Pacific, and Indian Oceans);

(2) the weeverfish (the Atlantic Ocean);

(3) the gobling fish (the Atlantic Ocean, the Mediterranean Sea);

(4) the stonefish (the Pacific Ocean, the Red Sea);

(5) the hairtail (the Atlantic Ocean);

(6) the moray eel (the Atlantic and Indian Oceans, the Mediterranean Sea);

(7) the sea stringing cat-fish (the Pacific Ocean).

The live fish can be harmful, if it is caught with the hands, touched, or stepped on accidentally while swimming. The symptoms of poisoning by poisonous stabbing fishes are: acute pain at the site of the wound, nausea and vomiting, dyspnea, fear, general weakness, fainting, and oedema of the affected area. The symptoms of poisoning increase during the first five to eight hours and subside within the next two to three days.

The wound should be washed with distilled water and dressed with a sterile bandage. The limb should be immobilized with splints and the patient delivered to a medical station for qualified medical help.

The meat, liver, blood, roe and milt of the puffer fish (fugu, tetradon) and some other fishes may cause poisoning if eaten.

To prevent food poisoning from fish only well known local edible fish species should be used as food.

INSECTS AND SPIDERS (*ARTHROPODA*)

Many insects and spiders are harmful to man; some species harmless in the temperate climates prove to be harmful in the tropics. The nearer the equator, the more diverse the class of insects, the greater their importance in the pathology of man and animals.

Most of the dangerous insects are bloodsuckers with a special apparatus for puncturing the skin. Some of these insects are dangerous because of their venom glands (the scorpion, karakurt, tarantula, scolopendra), others are carriers of infectious tropical diseases (fleas, lice, ticks, bugs, gnats, mosquitoes, sand flies, midges, flies, gadflies).

Since insects in the tropics are potentially so dangerous it is necessary to avoid contact with them. It is also important to know how to render first aid to a person injured by an insect.

Butterflies. The caterpillars of some butterflies (*Euproctis chrysorrhoes L, Thaumetopoes processionea L,* etc.) produce toxic substances. As the caterpillar crawls over the skin it leaves behind a pink swollen strip. An itching lesion should not be scratched since scratching may rub fine hairs of the caterpillar left on the skin into the wound; these hairs can cause an extensive lesion called caterpillar dermatitis. The condition is not dangerous and passes quickly. It is treated with creams and lotions, which soothe the itching.

Fleas. Various fleas – human, rat, marmot, dog, cat and sand (beach) fleas (Fig. 4) are harmful to man. They are carriers of plague and endemic (murine) typhus in areas where these diseases are found. The sandflea, common in tropical countries, is found in and around houses and cattle-sheds and on plants; it causes tungiasis (infestation of the skin with tunga penetrants).

Flea bites result in patches of swollen, itching skin at the site of the bite, which may suppurate if scratched or contaminated (with microbes). The bites of male and of non-fertilized female sandfleas do not differ from the bites of other bloodsucking fleas, but the fertilized

Fig. 4. Flea, carrier of plague

female flea burrows into the skin of the feet of both humans and animals where it swells to the size of a pea and discharges eggs.

Observation of the general rules of sanitation should keep the living quarters free of fleas. Rodents should be exterminated and the floors washed with hot water and soap. The carpets, the cats' and dogs' mats should be cleaned regularly. Repellents applied in small quantities to exposed areas of skin provide good protection for man.

Fleas in the premises can be exterminated with various insecticides.

Lice. Lice are the carriers of the endemic (epidemic) and relapsing fever. Parasitizing lice are rarely a problem nowadays because the level of personal and public

hygiene is higher than previously. Under certain conditions, however (contact with a lousy person or their clothing), anyone can become infested with lice. When biting the lice inject toxic substances of the saliva into the skin which cause severe itching, scratches, coarsening of the skin and its pigmentation.

Education of the staff and observance of the rules of personal hygiene play an important role in preventing lousiness. Lice on the body and in the underwear are exterminated with various insecticides. The eyes and lips should be kept from contact with the insecticides. The malathion insecticide must not be used by small children, pregnant women, or the sick. Groups working in the field in primitive conditions (for example, geological parties) should get rid of lice as follows: all the members of the group should wash simultaneously using insecticides, change their underwear and bedding, treat the collected clothing and their living quarters with insecticides.

Beetles. Blister beetles are widespread in the tropics. They have no stringing apparatus for the injection of poison and are harmful only if crushed against the skin. The poisonous substances that exude from the bodies of the beetles cause skin lesions in the form of blisters and oedema, accompanied by pain and burning. A crushed beetle that is accidentally swallowed causes watering of the mouth, burning sensation in the mouth and oesophagus, abdominal pain, vomiting, and diarrhoea. Contamination of the eyes with venomous fluid from a crushed beetle leads to serious inflammation of the conjunctiva. Victims are treated with pain-killing lotions and creams or with powders (10 grams of potato starch mixed with five grams of baking soda). The eyes are washed with a 2 per cent solution of baking soda. When

Fig. 5. Karakurt

the beetle gets into the alimentary tract, lavage of the stomach, abundant fluids and salt purgatives are prescribed.

When sleeping in the open use bed nettings to prevent contact with the beetles.

Due caution is necessary in areas where beetles feed or live (beaches, bushes on the sea shores, lake and river banks, sand dunes, mowed grass, and so on). Infested areas near the houses are treated with insecticides.

Karakurts (Fig. 5) like numerous other poisonous spiders (wolf spiders, bird spiders (Fig. 6), and others) usually do not attack but will bite when stepped on acci-

Fig. 6. Poisonous bird spider

dentally. Almost all poisonous spiders have venom glands, yet their bites, with rare exceptions, are no more painful than a pin prick. The bites of karakurts and poisonous spiders of certain similar species (the red-backed spider of Australia and New Zealand, the 'black widow' of California, and others) are rare but serious (the symptoms include pain in the limbs, shortness of breath, reddening of the face, fear, and so on). The victim recovers in three to five days. The victim is injected with antivenin (specific karakurt) serum, given a hot bath and hot tea or coffee, and transported to the medical aid station.

The best way to prevent karakurt bites is with measures designed to avoid contact with all poisonous insects (see also the section on scorpions). Vegetation around the house should be removed.

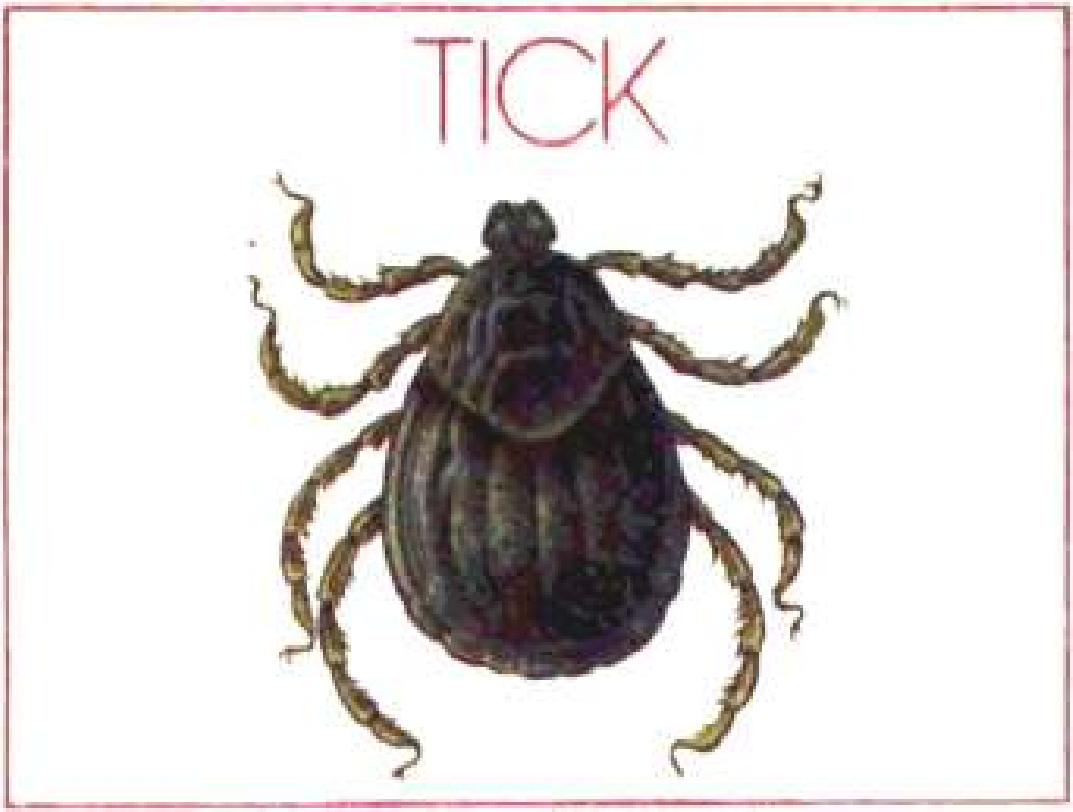


Fig. 7. Tick, carrier of rickettsial diseases

Ticks are the carriers and hosts of pathogenic organisms that cause infectious (bacterial, rickettsial, and viral) diseases in man (Fig. 7). The main diseases transmitted by ticks in the tropics are boutonneuse fever (Marseilles fever), Queensland tick typhus, Kyasanur Forest disease, tick spirochetosis, scrub typhus (rickettsiosis tsutsugamushi), Congo hemorrhagic fever and others. Some of these diseases are described in this booklet.

Ticks live on plants or in soil in burrows, cracks in the walls of cattle-sheds, and similar hiding places. They feed mainly on the blood of large mammals, birds, and reptiles and may also bother man. Lesions caused by bites of different tick species parasitizing on the skin vary consid-

erably, from itching, swollen skin rashes and red spots to deep, destructive processes in the skin.

The risk from ticks can be reduced by treating the skin with repellents. In areas where ticks are numerous special protective clothing impregnated with tick repellent is recommended. In areas inhabited by ticks workers should periodically examine their bodies and clothes for ticks. Tick adhered to the skin should be removed by placing a drop of oil or liquid paraffin on the tick or by searing it slightly with a match so that the tick falls away, complete with its proboscis. Another effective method of removing a tick is to tighten a loop of thread around its proboscis. Ticks adhered to the skin must not be forcibly pulled off since the suction apparatus (the proboscis and head) if left behind usually causes suppuration. The bite must be treated with iodine or a disinfecting anti-inflammatory cream containing cortisone and antibiotics. Ticks in their natural habitat are exterminated with insecticides (gammexane and other preparations).

Bugs. Bed bugs and triatomid bugs (also known as assassin bugs, kissing bugs and cone-nosed bugs) are a nuisance to man because of their painful bites. Triatomid bugs (Fig. 8) are also the carriers of a serious disease: South American trypanosomiasis (Chagas' disease), described elsewhere in this booklet. The bed bug is met everywhere. Triatomid bugs are found throughout the tropical and subtropical regions of South America where they live in human dwellings (usually in the cracks of adobe huts), in sheds for domestic animals, and in the burrows of rodents. Bed bugs may be introduced into a dwelling with infested household items; triatomid bugs can fly from premises to premises. At night the bugs creep out of the cracks in the walls and ceilings and out

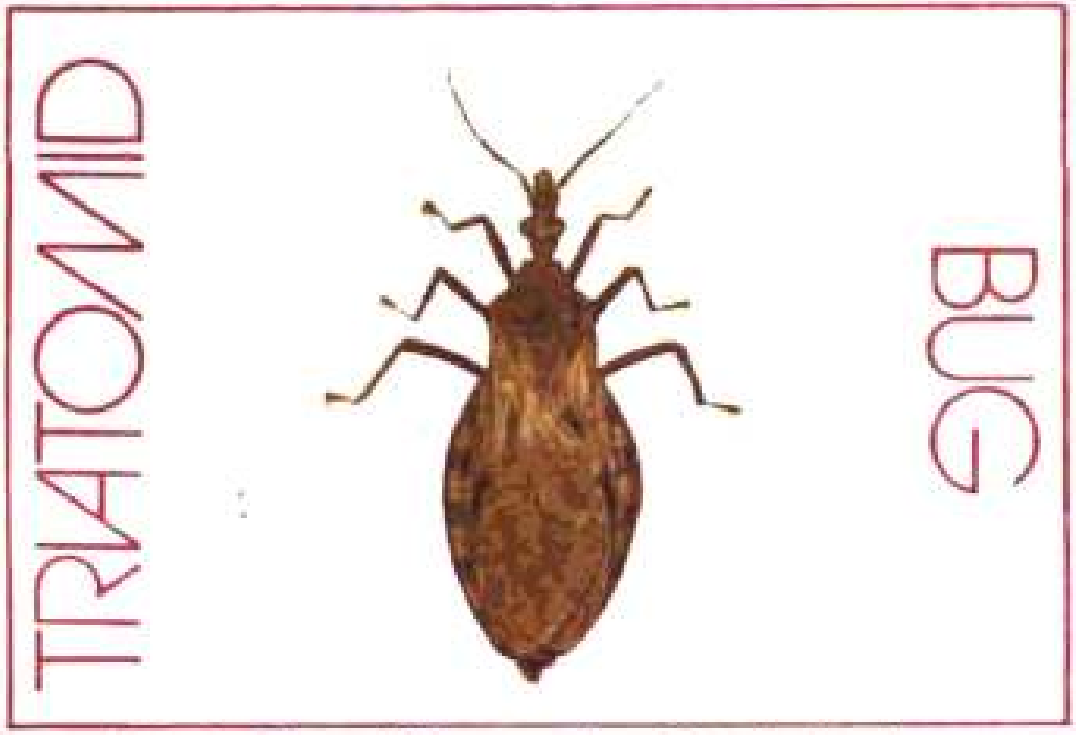


Fig. 8. Triatomid bug, carrier of South American trypanosomiasis (Chagas' disease)

of other shelters in search of food. The bite of a bed bug usually causes severe itching, blisters, and scratches. The triatomid bug usually bites near the eyes and on the lips. The bite causes rash, rapid heart beat, shortness of breath, and nausea.

Bed bugs are exterminated with Dipterex, Malathion insecticide, pyrethrum, Lindane, chlordan, with which the breeding grounds are treated. Triatomid bugs are exterminated with Dieldrin, hexachloran, Gammexane and other preparations. Cracks and chinks in the walls of the living quarters should be sealed. The use of bed nettings at night will help to prevent bug bites.

Mosquitoes. Altogether there are some 1600 species of mosquitoes in the world. In the hot climates these insects are extremely important since they are the carriers of more than fifty viral, bacterial, protozoan, and helmin-

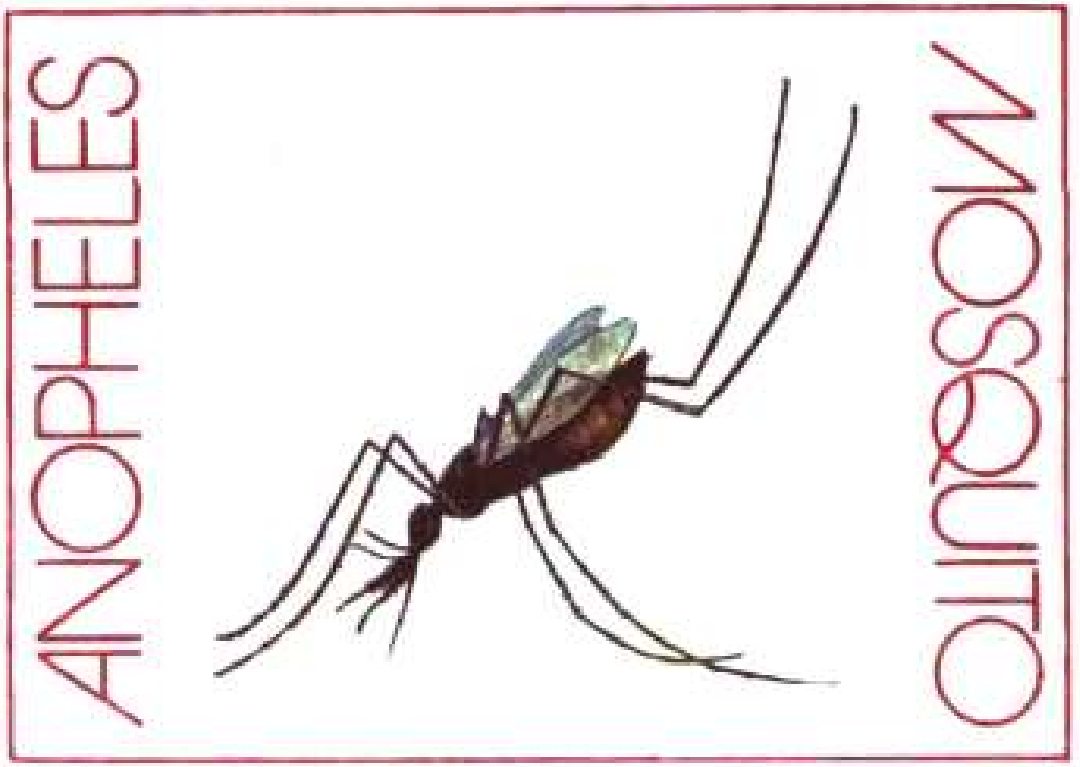


Fig. 9. Anopheles mosquito, carrier of malaria

thic diseases: dengue, yellow fever, viral encephalites, malaria, filariasis, and others (Fig. 9).

Climatic conditions in the tropics favour rapid reproduction of mosquitoes (their development from egg to adult form takes about ten days). The presence of large quantities of mosquitoes near living quarters depends mainly on the availability of suitable breeding places, namely, of natural or artificial reservoirs. Different species of mosquitoes prefer different types of reservoirs. Mosquitoes can breed in tins, watering cans, coconut shells, or any similar shallow containers full of water. Objects likely to become the breeding ground for mosquitoes must be disposed of or properly stored.

Female mosquitoes are bloodsuckers. Most species attack man between sunset and sunrise and are most active immediately after sunset and in the early morning.

In the tropical jungle, the mosquitoes remain active practically around the clock when the weather is cloudy. The mosquito rarely sucks enough blood from one man or animal at a time. Repeated and interrupted bloodsucking increases the chance of infection of the mosquitoes, who then transmit the pathogenic agents of various diseases to man and wild and domestic animals.

In man mosquito bites cause skin blisters resembling hives. Repeated, multiple bites can cause generalized cutaneous eruption especially in children with heightened sensibility to the mosquito venom.

In the tropics excessive perspiration aggravates the skin itching caused by the mosquito bites. Children scratch the bites which suppurate and, as a result, heal slowly. Such lesions are frequently accompanied by increase in body temperature, disturbed sleep, loss of appetite.

Protection against blood-sucking insects is of the utmost importance. The breeding grounds and habitats of these insects around the living quarters should be eliminated (shallow reservoirs filled up with sand, water containers covered with lids, and so on). Doors and windows should be provided with fine-mesh metal screens to prevent the entry of mosquitoes and other insects while allowing for proper aeration of the building. Before going to bed the living quarters (particularly the bedrooms) must be checked for mosquitoes. The ceiling, walls, shady areas behind the wardrobes and other pieces of furniture, the lamp cords, window panes, and so on, must be examined thoroughly. In the house mosquitoes should be exterminated with commercial aerosol insecticides ('Flyspray', 'Flit', 'Shelltox', or certain other preparations).

In the tropics during the hours of peak mosquito activity it is better to stay indoors. When it is necessary to stay outside after sunset (for evening or night work, to go to the cinema or for a walk) use repellents and wear clothes that properly protect the neck, arms and legs.

Recommended brands of repellents are DET, 'Flypel', 'Skeet-o-Stick', 'Off', 'DMP', 'Indalone', 'Rutgers 612', 'KIK Aerosol', 'Sketofax', and others.

The repellents, either liquid or creams, must be used as specified in the instructions. They are effective for three to eight hours (depending on the air temperature and humidity, perspiration, contact with water, the user's physical features, and the aggressiveness of the mosquitoes). The repellent is reapplied as needed. Repellents damage plastics (the rims of eyeglasses, watches), certain synthetic fabrics, nail polish, and painted and polished articles, but do not affect cotton and woollen fabrics which can be sprayed with repellent from aerosol cans or treated with ten to fifteen drops of repellent rubbed in by hand. Remember that clothes treated with repellent do not protect the uncovered parts of the body (hands, face).

In the tropics every member of the family should use mosquitoe bed netting at night. The bed netting must be checked and mended regularly. Before going to bed the netting should be examined for mosquitoes and the loose ends tucked safely under the mattress. Bed netting from fabric that lets in minute, blood-sucking insects (sand flies, midges) can be treated with repellents.

To relieve the itching, the bites are treated with creams or lotions, eau de cologne, or liquid ammonia. Children with complicated, multiple bites should be kept indoors until completely recovered.

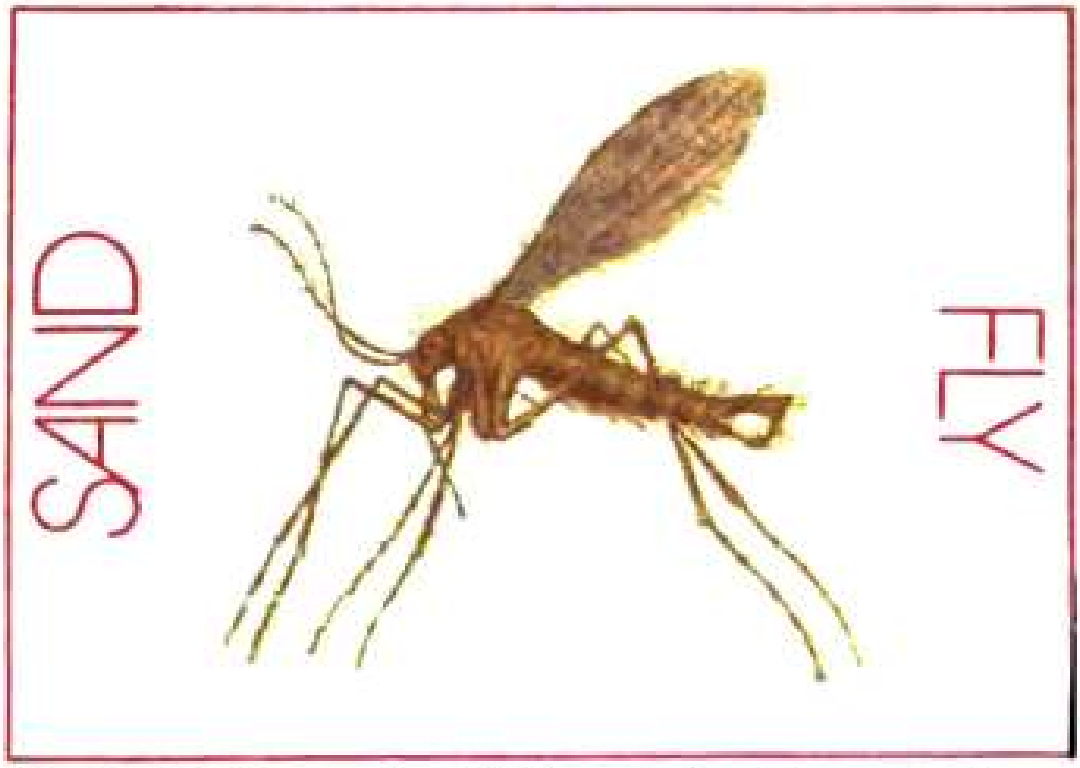


Fig. 10. Sand fly, carrier of leishmaniasis and pappataci fever

Biting midges, the smallest blood-sucking insects (1 to 2 mm), look like mosquitoes. In the tropics they are the carriers of some blood helminthic diseases. In Africa biting midges are most numerous and most troublesome on banana and other plantations. The coast and islands of the Caribbean Sea are also infested with biting midges. The midges are most bothersome outdoors in the evening and early morning, although some species attack during the day as well. They bite mostly on the face and neck. Skin reactions are similar to those caused by mosquito bites, and protection is the same as from mosquitoes.

Sand flies are small, blood-sucking, heat-loving insects found mainly in the tropics and subtropics (Fig. 10). They are especially numerous in countries with a hot, dry climate (the Sudan). They are the carriers of Bartonel-

liasis, leishmaniasis and pappataci fever. In the tropics sand flies remain active all year round. Near human settlements they are most often found in rubbish heaps, rodents' burrows, cellars, crawl spaces, and other similar places. In the wild sand flies inhabit hollow tree trunks, rodents' burrows, nests of certain birds, caves, and so on.

The female sand fly feeds in the evening (before and during the first hours after sunset). Sand flies usually attack in the open, although some species are a nuisance indoors as well. Their bites cause pain, itching, and blisters. Multiple bites can affect an individual's health; children especially may experience a loss of appetite, disturbed sleep, or fever.

With repeated bites the organism develops a heightened sensibility to the toxins in the saliva of the sand flies. This leads to itching dermatitis (inflammation of the skin) called phlebotodermiasis (Phlebotomus is the name of the sand fly). The disease is not fatal.

The bites of sand flies can also cause various forms of endemic urticaria. This disease is most often found in Algeria, Egypt, Bulgaria, Israel, Jordan, Iraq, Iran, Lebanon, Saudi Arabia, Syria, Sudan, Tunisia, Turkey, and Yugoslavia. Badly itching, pinkish blisters, sometimes filled with fluid, cover the hands, face, ankles, and other parts of the body and in a month or two the blisters disappear. The disease is not dangerous. Cool showers, rest, air-conditioning, and a mild diet help to relieve the irritating symptoms. Creams and lotions to relieve the itching are applied locally. Infectious diseases transmitted by sand flies are described elsewhere in this publication.

Screening of the doors and windows and use of bed nettings and repellents protect against sand flies.

Workers in the deserts should wear protective outer garments.

Black flies are small (1.5 to 3 mm), blood-sucking insects found everywhere, including the tropics, where they are particularly harmful. In Africa and Central America black flies are the carriers of a serious tropical disease called onchocerciasis (river blindness) (described elsewhere in this publication).

Black flies breed mostly in swift-running water well saturated with oxygen (in pebbled streams, rivers with rapids and stones, and so on). They bother man and animals both near their breeding grounds and away as far as five to ten kilometers from them. The black flies attack man before sunset and late in the morning. The saliva of the black flies is highly toxic. Severe pain, oedema, and itching develop at the site of the bite. In areas where they are numerous black flies can be an extreme nuisance to the inhabitants, and cattle poisoned by the toxins in their saliva frequently die or lose considerable weight. Work near the habitat of the black flies is practically impossible without effective protection with repellents, special outer garments, netting, and bed netting. If geologists, agronomists, or other specialists are working near streams and rivers where black flies habitate, the surrounding vegetation should be treated with insecticides.

Flies are found everywhere in the world and they have a considerable effect on the public health. For example, the tsetse fly, which is widespread in Africa, is the carrier of the so-called sleeping sickness (African trypanosomiasis); the maggots of certain flies provoke myiases – diseases caused by parasitizing of those maggots in human and animal tissues (described elsewhere in the booklet).

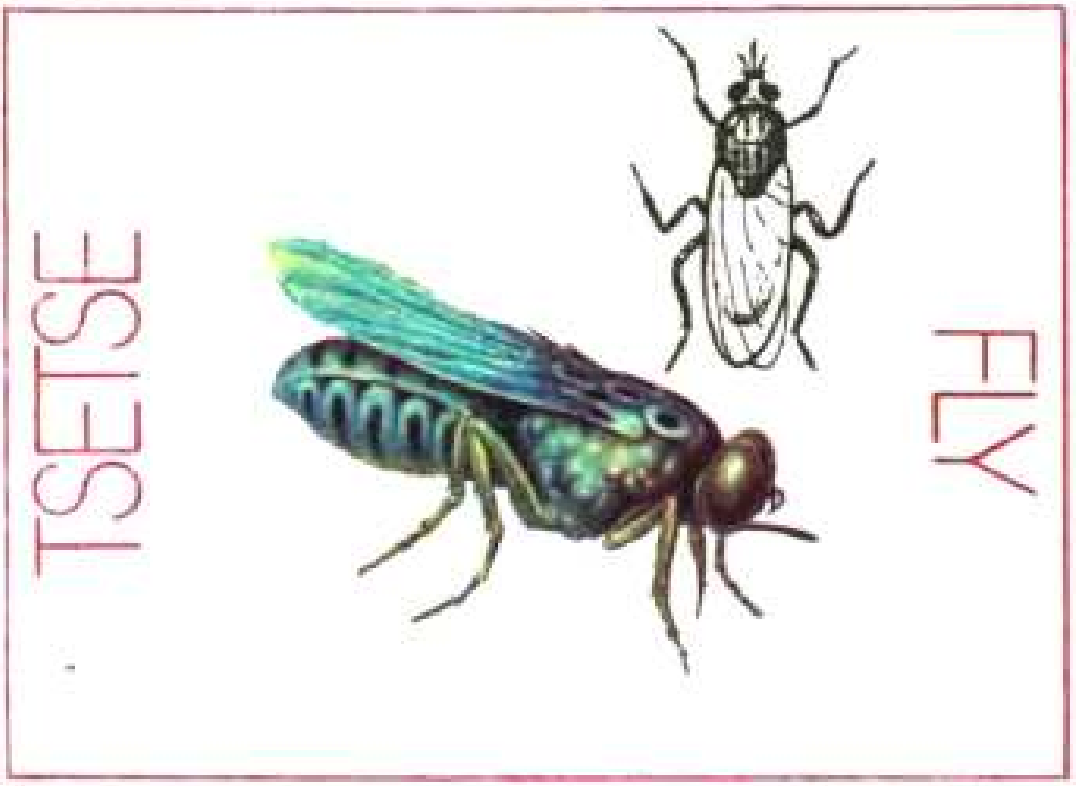


Fig. 11. Tsetse fly, carrier of sleeping sickness

The flies are also the carriers (transmitters) of gastrointestinal diseases, diseases of the eye, and so on.

Tsetse flies (6.5 to 9 mm) are distinctive in appearance (see Fig. 11): their wings overlap over the abdomen; the proboscis projects forward; the abdomen is spotted. Tsetse flies feed on the blood of cattle, wild animals, birds, reptiles, and man. They are particularly troublesome on the banks of reservoirs shaded with vegetation; certain species attack man in the savanna and in tropical forests. Tsetse flies are frequently attracted by dark clothing.

Stable flies are blood-sucking insects. They are an extreme nuisance. Large numbers of these flies seriously hamper work and rest.

House flies feed on garbage and sewage and then contaminate bread, meat, and fruit with viruses and bacteria. In the tropics house flies are the main carriers of typhus, dysentery, cholera, poliomyelitis, Botkin's disease, and other diseases.

House flies can be controlled following simple rules of sanitation. At night stray dogs, hyenas, and cats frequently pilfer garbage not kept properly in the yard, and flies breed on the scattered garbage. The garbage bins should be provided with locks. Outdoor latrines must be fitted with tight lids that are kept closed. Other sanitary measures include the use of insecticides for extermination of flies and maggots in their natural habitat. Aerosol insecticides – 'Antisect' and other brands – can be used indoors.

Wasps and bees sting mostly when their nests are destroyed. The wasp's venom is more dangerous; multiple stings (especially by hornets) can result in severe oedema, haemorrhaging, rapid pulse, and restlessness. In severe cases the victim should be transported to the hospital.

To avoid stings be careful when eating fruit and sweets and when destroying (burning) nests (tropical wasps often build their nests in human dwellings).

Scolopendras are widespread in the tropics. Their venom can cause either slight skin lesions, which heal quickly, or extensive swelling, chills, general indisposition, rise in body temperature, and so on. Scolopendras may crawl into the nasal cavities of victims as they sleep and cause inflammation of the mucous membranes, or nervous disorders.

Treat the bite with liquid ammonia or anaesthetic ointment. Prevention is the same as with other venomous insects.

Fig. 12. Black scorpion

Scorpions, especially in the tropics, are the most poisonous arthropods in relation to man (Fig. 12). Scorpions are nocturnal insects and hide during the day under stones or fallen tree branches. At night they may crawl into human dwellings and crawl into footwear.

Scorpions have two crab-like claws with which they hold or pinch their victim while stinging with a sharp spine set on the end of the tail. They will attack man only if disturbed or stepped on. The scorpion's sting is very painful; if considerable poison has been injected the sting causes weakness, nausea, vomiting, and excessive perspiration, although the symptoms soon pass. Fatal cases in young children, although they do occur, are rather rare. The victim must be transported to the hospital and given an injection of karakurt spider serum. The site of the

sting is anaesthetized (with ointment or an injection of a 2% solution of novocaine or emetine around the site) and bandaged. Give the victim tea or coffee.

To prevent stings it is important to be careful in the evening and at night and to avoid going barefooted. Examine the house and bed before bedtime for scorpions. Use bed netting, and tuck it properly under the mattress.

Gadflies, large (10-30 mm), blood-sucking insects, are the carriers of loiasis ('Calabar swellings'), a disease widespread in the tropics (Western and Central Africa).

Gadflies usually bother man and animals during the day near their breeding grounds (in damp areas). Certain tropical species of the gadfly are active only at dusk. Gadflies' stings are painful. Contaminated bites sometimes turn into septic sores.

For protection against gadflies use repellents and, if found necessary, wear protective outer garments.

Cockroaches are extremely widespread in the tropics. They contaminate food with their excreta. Some species (American and oriental cockroaches found in the tropics) attack and injure the skin of sleeping children at night. Scratch-like lesions that develop on the surface of the skin where it has been gnawed by the cockroaches exude lymph and sometimes suppurate. The disease is not dangerous.

Protection is provided by extermination of the cockroaches indoors with insecticides and use of bed netting at night.

POISONOUS PLANTS

Lesions from certain poisonous plants are common to local residents, who use many local plants as food and

medicine or encounter them in their work on plantations or in the jungle. Newcomers rarely suffer from such lesions, which as a rule heal quickly. The most poisonous plants are found in the spurge family (*euphorbia*, blinding tree), the jacaranda, the strychnine tree, the upas tree (on Java), poison ivy, and other plants.

Contact with the juice, leaves, flowers, or bark of these plants produces a burning sensation. Itching skin rash or blisters and boils with jagged edges also develop. Scratching contaminates various parts of the skin and the itching blisters may resemble long strips. The disease is sometimes accompanied by oedema of the face, lips and larynx, a rise in body temperature, shortness of breath, and headache.

Poison ivy causes exfoliation of the outer layer of skin on the hands. The blinding tree causes severe eye lesions. Some plants remain poisonous even after they are dried. In the tropics, as well as in the temperate zone, children sometimes suffer allergic hives when the grass is mown.

Cases of poisoning with the seeds of poisonous plants should be treated at the hospital. In cases of skin irritation the entire body should be washed with soap and water. Body oils and ointments should not be used as they impede the removal of toxic substances from the skin.

The first and foremost rule in protection against poisonous plants is to avoid contact with unknown tropical plants and never use them as food. Specialists working on plantations of poisonous plants must follow existing instructions.

Prevention of Infectious and Parasitic Diseases

Almost all known infectious diseases of man–both diseases common to a temperate climate and specifically tropical diseases–are found in the tropics.

This publication describes only the most widespread tropical diseases which are practically unknown to people travelling for the tropics (diseases transmitted by insects, parasitic worms, viral and gastrointestinal diseases). In the tropics it is vitally important to observe the rules of sanitation faithfully and to keep the measures for prevention of diseases always in mind. The main keys to good health in tropical countries are clean living quarters and food, personal hygiene, protection from insects, and a sensible schedule of work and rest.

AMOEBIASIS (AMOEBIC DYSENTERY)

Amoebic dysentery, a gastrointestinal disease caused by amoebae, is characterised by ulceration of the large intestine, frequent stool containing blood and mucus, weakness and depression. Dissemination may occur

through the blood stream producing abscess of the liver or, less commonly, of the lung or brain. The disease is spread by hand-to-mouth transfer of fresh feces, by contaminated raw vegetables, by flies, soiled hands of food handlers, and, perhaps, by water. The source of infection is man. In countries with poor public sanitation up to fifty percent of the population may carry amoebae. Newcomers to the tropics frequently get infected. A diagnosis of amoebic dysentery can be confirmed by microscopic analysis of the stool. Travellers coming back from the tropics should be examined for amoebiasis.

Prevention of the disease is provided through personal hygiene and sanitation. Flies should be exterminated, the dishes and kitchen utensils kept clean, drinking water boiled.

AMERICAN TRYPANOSOMIASIS

American trypanosomiasis (Chagas' disease) is common in the countries of Central and South America. The disease is caused by infection with protozoal parasites of the genus *Trypanosoma* (Fig. 13). The trypanosomes are transmitted by the triatomid bug from infected human beings or wild animals (armadilloes (Fig. 14), opossums, wood rats, monkeys, and others). Newcomers who live, as a rule, in urban houses provided with modern conveniences, very rarely get infected. Two or three weeks after a bite by an infected bug, an inflamed skin lesion resembling a furuncle develops. The body temperature rises, and oedema and enlargement of the lymph nodes, liver, and spleen may occur. If the disease becomes chronic, the intestine and cardiac muscles are affected.

To prevent the disease contact with triatomid bugs

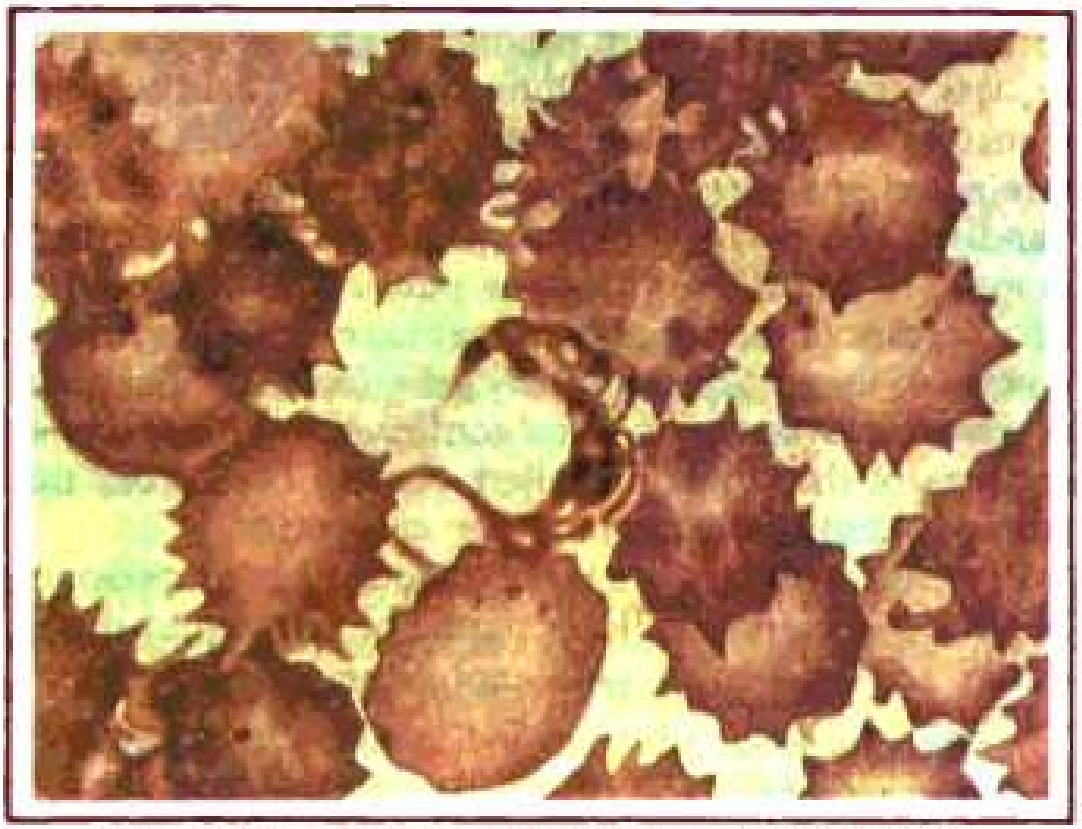


Fig. 13. Trypanosome, causative agent of American trypanosomiasis

must be avoided in areas where trypanosomiasis is common. Houses equipped with modern conveniences provide reliable protection against the disease. Houses in the country and the adjacent territory should be treated with insecticides. Cracks in the walls must be properly sealed. Bed netting should be used at all the times.

ANKYLOSTOMIASIS

Ankylostomiasis is a worm disease widespread in tropical countries with unsatisfactory public sanitation. Infestation occurs through contact with soil or vegetation contaminated with the mature larvae of the hookworm. The larvae penetrate through the skin causing itching. In

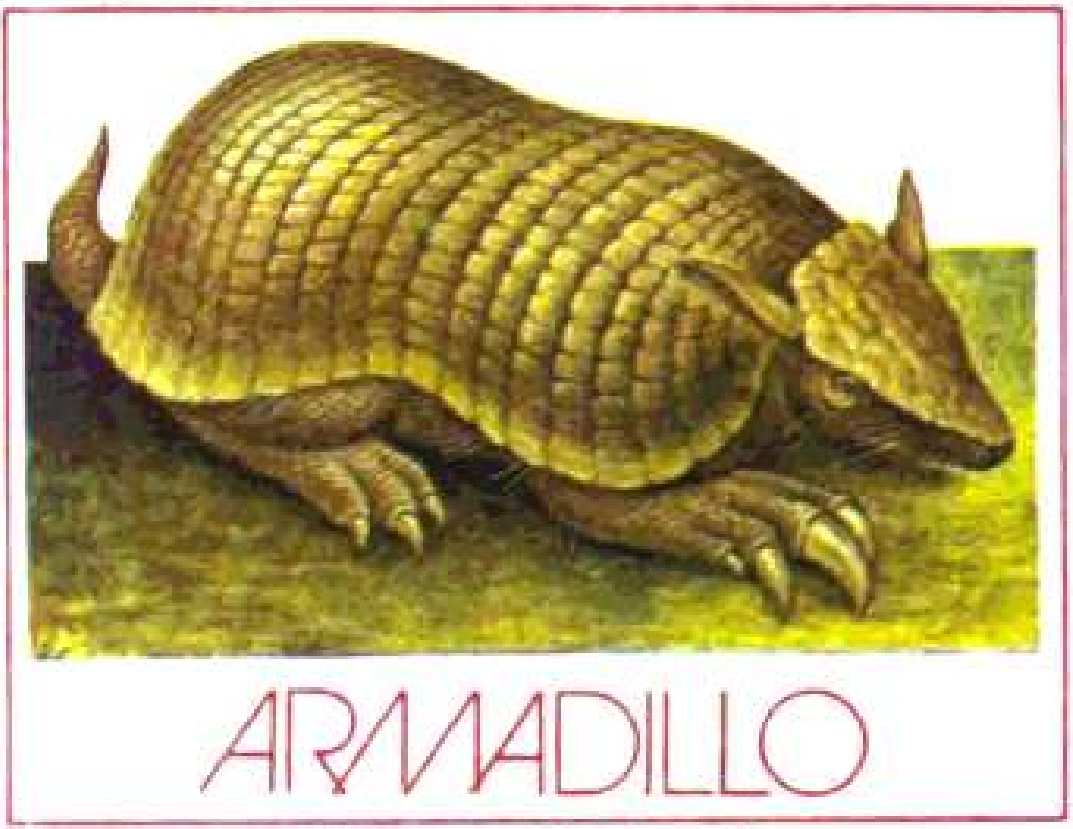


Fig. 14. Armadillo, intermediate host of trypanosomes (causative agents of American trypanosomiasis)

five weeks stomach and intestine disorders, pain in the upper stomach, dizziness, loss of weight, and anaemia may occur. Infestation can also result from eating unwashed vegetables or drinking contaminated water. The disease is not serious and can be successfully treated. Travellers returning home should be examined for the worms.

Individual preventive measures include wearing shoes and long trousers, using mats to sit or lie on the ground, and washing fruit and vegetables with soap and boiling water. Do not let the children play in sand or yards and gardens contaminated with feces. Periodic laboratory examination of the stool can detect the presence of larvae and prevent their development.

Fig. 15. Trypanosome, causative agent of African trypanosomiasis

AFRICAN TRYPANOSOMIASIS (SLEEPING SICKNESS)

African trypanosomiasis is found only in Africa and is caused by trypanosomes (Fig. 15). The disease is carried by the tsetse fly from infected human beings or animals (antelopes (Fig. 16), pigs). Vast areas of tropical forests and savanna are inhabited by the fly, yet the disease is spread very irregularly. Therefore newcomers should find out from the local medical authorities which areas are infested.

The disease is characterized by enlargement of the lymph nodes, fever, skin rash, and general weakness. If the nervous system is affected, nervous disorders and lethargy occur. These symptoms become obvious about two or three weeks after the bite of the tsetse fly.

As soon as the symptoms appear, the individual should be examined for sleeping sickness. If the disease is confirmed, treatment must begin immediately.

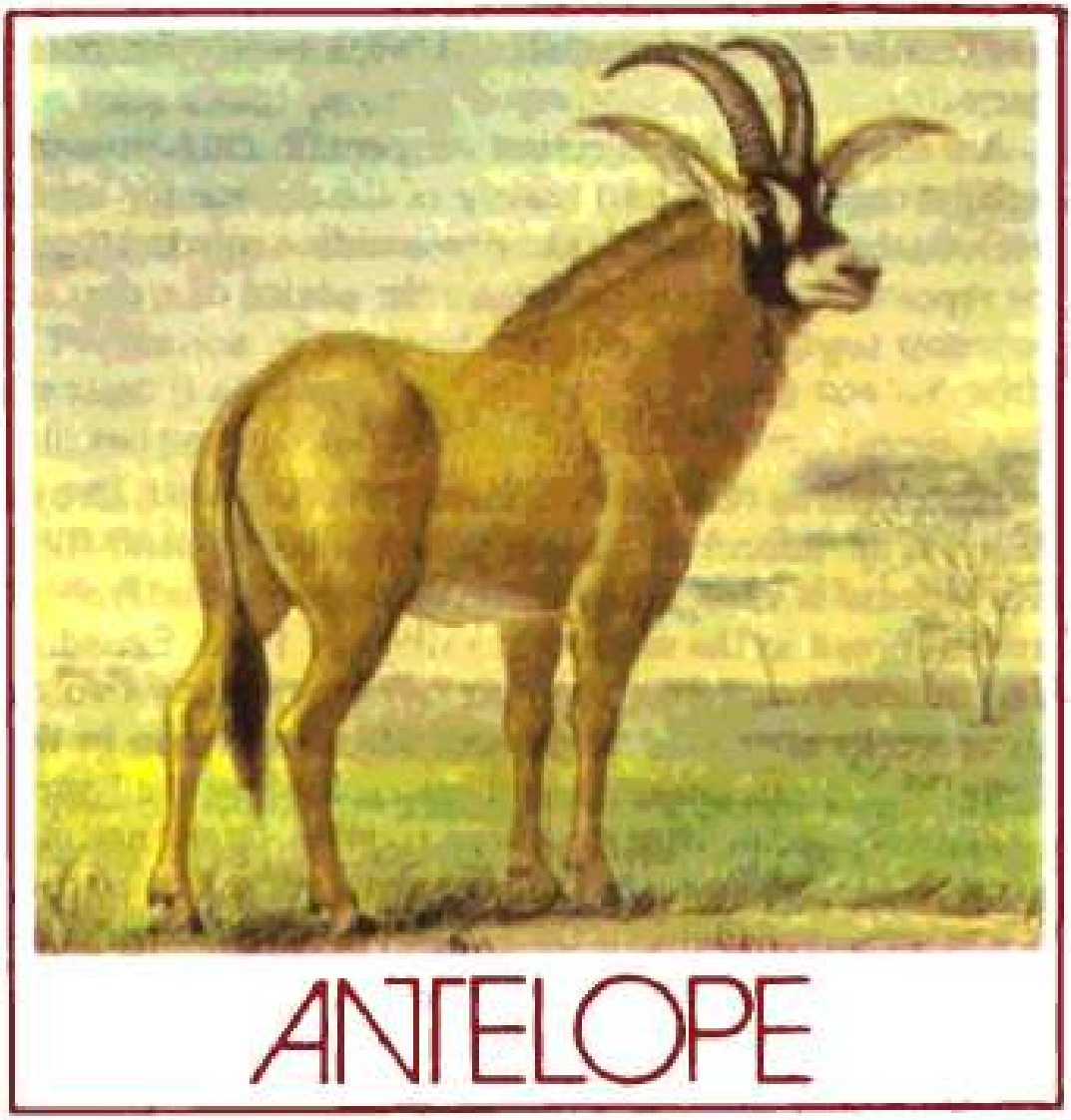


Fig. 16. Antelope, intermediate host of trypanosomes (causative agents of African trypanosomiasis)

To prevent sleeping sickness, contact with the fly should be avoided as should areas where the disease has been detected. Geologists, hunters, fishermen, forestry and agricultural specialists, and visitors to national parks and reservations are the most likely people to come in contact with the tsetse fly and they should take due precautions by wearing white or light-coloured trousers and long-sleeved shirts, and using repellents. Permanent

workers in infected areas should wear protective outer garments.

An intramuscular injection of pentamidine protects against the West African variety of the disease for up to six months. If necessary, the pentamidine injections can be repeated after six months, on the advice of a doctor.

BARTONELLOSIS

Bartonellosis (Carrion's disease, Peruvian wart, Oroya fever) is an infectious disease transmitted by sand flies. The disease is caused by bacteria *Bartonella baciliformis* and is spread in the mountain valleys of Peru, Ecuador, and in south-western Colombia. Approximately two or three weeks after infestation sporadic fever, pain in the bones and joints, anaemia, and enlargement of the lymph nodes can occur. One to three months later, nodules form on the skin and the mucus membranes. The disease is less serious in children than in adults. Newcomers seldom become victims of the disease.

To prevent bartonellosis limit visits to areas of infection, use repellents after sunset when sand flies are active, and wear protective outer garments.

TROPICAL TREPONEMATOSES AND VENEREAL DISEASES

The high rate of infection with these diseases in tropical countries is the result of poor sanitary conditions (overcrowded dwellings, poverty). The tropical treponematoses, such as frambesia (tropical syphilis), bejel (Arabic syphilis), pinta are characterized mostly by ulcerative

destructive lesions of the skin and changes in bone. They are transmitted through household articles (towels, bed linen, dishes). They are chronic diseases. Venereal diseases – *Lymphopathia venereum* (the fourth venereal disease) and donovaniasis (the fifth venereal disease) – are transmitted mainly through sexual intercourse.

Prevention of venereal diseases and tropical treponematoses is accomplished through avoiding contact with infected persons and their belongings (dishes, towels, and so on) and by observing the rules of personal hygiene. Persons who have had contact with infected persons or their household articles must be treated by a doctor.

FUNGOUS INFECTIONS

Newcomers to the tropics from temperate climates frequently catch fungous infections which are widespread in the hot and humid climate and poor sanitary conditions.

Fungous diseases in the tropics are extremely common among the local population and newcomers, and are highly contagious because the protective functions of the skin are weakened by the climate. The infections are usually extensive and protracted.

Without going into details of the numerous fungous infections, it should be noted that fungous diseases (especially of the foot) which the newcomers thought cured may sometimes flare up: newcomers most frequently suffer from epidermophyton of the feet, hands, and groin, which is characterized by itching, reddish skin rashes, with or without blisters, between the fingers, toes, or elsewhere. The disease may be manifested by changes in the thickness, colour, and texture of the nails. The infection in the groin is characterized by itching, reddish-

Prevention of Tropical Diseases

brown scaly areas. Infection occurs most often in swimming pools, bath-houses, public showers or baths, and hotels through contact with fungi-contaminated floors, carpets, mats, furniture, clothes, footwear, or towels. Fungi are most resistant in the hot and humid tropical climate and can persist on various articles (especially footwear) for a long time.

If treatment is started early, fungous diseases can be cured, although they take a long course, with alternating periods of improvement and exacerbation.

In the tropics it is most important to pay constant attention to the prevention of fungous diseases. The skin must be kept scrupulously clean (especially the armpits and skin folds). The feet should be dried thoroughly with a towel, especially between the toes and dusted with talc or fungicidal powder. If infection occurs consult a doctor promptly. Appropriate measures must be taken to limit the spread of infection and to prevent the contamination of household articles. A special towel should be used to dry the feet. The towel and socks must be boiled and ironed daily. Footwear (shoes, slippers) can be disinfected by placing cotton wool soaked with a solution of formalin or vinegar essence in the shoes for twenty-four hours. The disinfected shoes (slippers) must be aired for a day or two before wearing. Alcohol or eau-de-cologne should not be used for treatment since they worsen the condition.

Examine the skin daily for symptoms of the disease. Excessive perspiration must also be treated. Only personal footwear should be worn in bathrooms, swimming pools, and similar public places. Fungicidal powders (Tinaderm, Tinefax, and others) are available at the chemist's.

Fig. 17. Causative agent of dracunculosis in the subcutaneous tissue

DRACUNCULOSIS

Dracunculosis (rishta) is a worm disease widespread in the tropics and subtropics where it affects mainly the local population. The disease is caused by *dracunculus medinensis*, the definite hosts of which are man and, less frequently, dogs and monkeys. The intermediate hosts (vectors) are cyclops. Man becomes infected by drinking raw water with infested cyclops. The cyclops become infested with parasite's larvae from infected persons bathing in ponds. The number of larvae brought forth by the female rishta reaches 8 to 10 million. In man the female lives in the subcutaneous tissue, mainly in the legs (Fig. 17). Between eight and fourteen months after infes-

tation the gravid female becomes ripe for bringing forth its larvae. Its head approaches the skin and a blister, up to 7 cm in diameter, is formed; the blister breaks open near its centre. When the blister comes into contact with water the uterus of the worm ruptures shedding forth the numerous number of larvae. The latter swim out into the water where they are swallowed by cyclops. The disease is accompanied by fever, nausea, vomiting, diarrhoea, dyspnea and hives. After removal of the worm the ulcer takes aproximately a month to heal. Dracunculosis rarely affects newcomers to the tropics.

Prophylaxis of dracunculosis is provided by drinking only boiled or filtered water. It is also necessary to avoid bathing in ponds because of the possibility of swallowing water with infested cyclops.

YELLOW FEVER

Yellow fever is a viral disease spread in South America, West, Central, and East Africa among monkeys and other mammals. The disease is transmitted to man by mosquitoes, which can also transmit the disease from an infected to a healthy person. Only the females contract the infection and transmit it. The mosquitoes become infective to man only some time after ingestion of infested blood. At high temperatures this period shortens up to 6 days. Nowadays, thanks to an effective vaccine, yellow fever has become rare in human beings (in 1971 only 162 people worldwide contracted yellow fever).

In nonvaccinated persons the disease takes an acute and severe course: three to five days after a bite of an infected mosquito, the disease sets in with an abrupt rise of temperature. The victim becomes extremely excited and

restless, and complains of general pain. The face becomes flushed and swollen; nausea, vomiting, intestinal haemorrhages, and jaundice appear. The disease lasts from ten to fifteen days and may be fatal. People who recover from yellow fever acquire a lifelong immunity.

Prophylaxis of yellow fever is quite simple. Persons leaving for or passing through the yellow-fever zones of Africa and America are inoculated ten days before departure. Inoculation against yellow fever is painless and has few side effects. Inoculation against yellow fever should not be performed at the same time as inoculation against smallpox. Children can be inoculated from the age of nine months. Inoculation becomes effective after ten days and remain effective for ten years. The vaccinated person is issued a certificate with the doctor's signature and the stamp of the medical station where the vaccination was performed valid for ten years. The certificate is shown, on request, to medical officers at health control stations in airports, ports, and elsewhere.

Nonvaccinated persons or those who have lost their certificate may be put in quarantine for nine days. Protection from mosquitoes (bed netting, insecticides, repellents) helps prevent yellow fever.

TICK-BORNE SPIROCHAETOSIS (TICK-BORNE RELAPSING FEVER)

The disease is found in Africa, Saudi Arabia, Iran, India, Central Asia, Central and South America. The causative agent of tick-borne relapsing fever are spirochetes (spiral bacteria) contained in the blood of relapsing fever patients. These spirochetes are transmitted by the relaps-

ing fever ticks. A hungry tick is dark-grey; after it has its fill of blood it becomes dark-red or dark-brown.

The ticks bite men and animals both during the day and at night. After the tick has punctured the skin it extracts blood. Some species of ticks transmit the spirochetes directly with their bite; in other species a fluid containing spirochetes is excreted from the coxal glands on its legs while the insect feeds. This fluid contaminates the wound caused by the bite, and thus the infection is transmitted. The disease lasts several weeks and is accompanied by intermittent fever (for two to five days, followed by normal temperature for two to four days) and skin rashes. The disease affects mainly the local population.

Prophylaxis is provided by limiting visits to places inhabited by relapsing-fever ticks (adobe houses, sheds, caves) and use of repellents.

LEISHMANIASIS

Leishmaniasis is a group of diseases caused by protosoan parasites of the genus *Leishmania*.

The cutaneous leishmaniasis is characterized by ulcerating of the skin and mucous membranes.

In the case of visceral leishmaniasis the parasites habitate the spleen, liver, lymph nodes. This form of the disease is the most dangerous one. In natural conditions the hosts of leishmaniasis infection are dogs, jackals, certain other animals, and man.

The vectors of cutaneous and visceral leishmaniasis are the sand flies (genus *Phlebotomus*). They are small yellow-brown, two-winged insects 2-3.5 mm long. The females feed on human blood and the blood of domestic

and wild animals; they live approximately three weeks. After laying about 40 to 50 eggs they usually perish. The favourite breeding places of sand flies are cellars, wall cracks, humid places.

Effective prophylaxis of leishmaniases among newcomers to the tropics depends, to a great extent, on their knowledge of the infected areas and of the activities of the sand fly (see section 'Sand flies'). Visits to infested regions should be limited, other necessary protective measures (the use of repellents, insecticides to destroy the sand fly breeding grounds near human dwellings) must be taken, and special clothing worn.

Experts and specialists who have to work in localities badly infested with cutaneous leishmaniasis should be inoculated with specific intracutaneous vaccinations.

DENGUE

Dengue is a viral disease caused by virus *Viscerophilus dengue*. The virus is transmitted by mosquitoes that ingest the blood of human dengue patients and infected mice to other people through their bites. The disease is spread in the tropics and subtropics, especially in the countries situated in the south-west of the Pacific Ocean. Severe forms of dengue have been recorded lately in the cities of south-eastern Asia. Newcomers rarely become infected.

The disease lasts approximately seven days. The symptoms are severe headaches, pain in the muscles and joints, fever, and skin rashes (on the third or fourth day, after the temperature drops). Minor haemorrhages sometimes appear on the skin of the feet. In children the disease is less severe. Recovery is accompanied by fatigue

and depression. The outcome of the disease is favourable.

Dengue can be avoided by protection from the carriers of the disease (see section 'Mosquitoes').

PAPPATACI FEVER

The causative agent of pappataci fever is the virus *Febrigenes papatasii*; it is transmitted by phlebotomus sand flies. Six to eight days after ingesting the blood of a pappataci patient the sand fly becomes capable of transmitting the infection to a healthy person. In most people the disease is characterized by reddening of the upper half of the eyeball and conjunctiva, nausea, a swollen face, headaches, and fever up to 40°C; movement of the eyeball is accompanied by acute pain. The disease lasts 3 to 4 days. It is common in areas infested by sand flies. (See the sections 'Sand flies' and 'Leishmaniasis'). The disease is not life-threatening.

Prevention of pappataci fever involves protection against the sand fly.

TSUTSUGAMUSHI DISEASE

The disease, found in India, East and South-West Asia (Burma, Malaysia, Indonesia, and other countries) and Australia, is transmitted through the bites of the larvae of the velvet mite. A small ulcer develops at the site of the bite. Fever, headaches, inflammation of the eye conjunctiva, skin rashes over the tors and extremities, enlargement of the lymph nodes also occur. In elderly patients the disease can be severe. The most frequent victims of the disease are agricultural workers.

Protection from the disease includes combating the mites and avoiding contact with them. Use repellents to protect the exposed skin portions and saturate clothes and blankets with them. Camp sites (for geologists, tourists, soldiers, and so on) should be cleared by burning the undergrowth and exterminating the burrows of rodents. The camp site should be treated with long-lasting antimite preparations (dieldrin, lindan, Malathion insecticide).

MALARIA

Although progress has been made in the battle against the disease, still malaria remains widespread in the tropics. Newcomers from more temperate climates frequently fall ill with malaria.

The four known species of the malaria parasite cause various forms of the disease which differ in severity. Prevalent in the tropics is the strain most dangerous for man – malignant (tropical) malaria.

The disease is transmitted (in the tropics nearly all year round) by the *Anopheles* mosquito, which can be distinguished from the common mosquitoes by the attitude of its body when at rest. The anopheles mosquito rest at an angle to the surface rather than horizontal to it (Fig. 18). Mosquitoes, after sucking the blood of infected persons, infect healthy persons with malaria parasites in their saliva when they bite.

In the human organism the parasites complete their developmental cycle. The duration of the cycle determines the onset of the disease (in the case of malignant malaria, the disease develops nine to fifteen days after the bite). Irregular attacks of malignant (tropical)

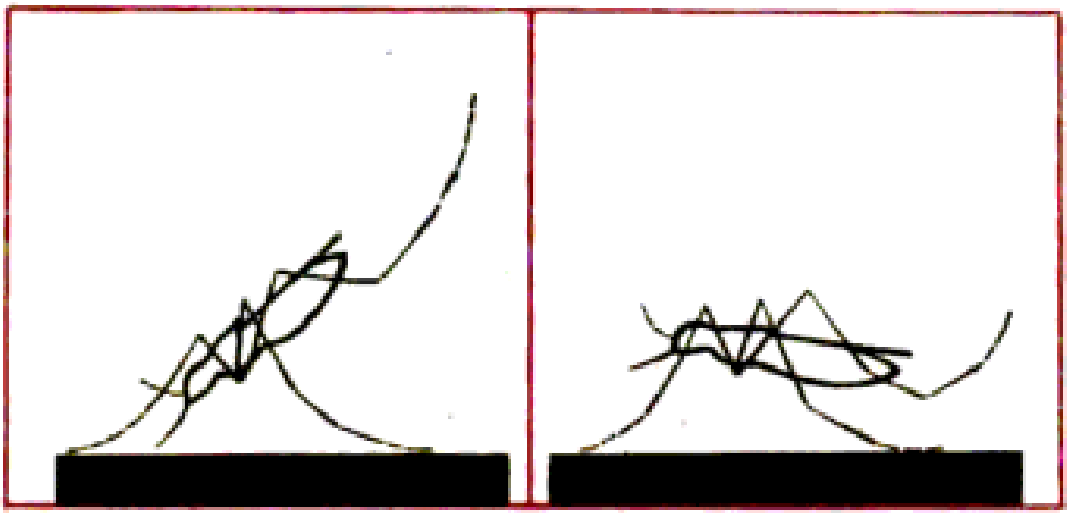


Fig. 18. Mosquitoes at rest: *a* – malaria mosquito; *b* – non-malaria (common) mosquito

malaria are accompanied by fever, chills, profuse perspiration, and sometimes vomiting. Untreated malaria may be fatal or it may become chronic. In untreated patients the parasites of malignant malaria survive two years. Treatment of the disease results in complete recovery.

It must be borne in mind that the clinical picture as described here is characteristic of other, acute tropical diseases as well as malaria. The clinical course of the disease is different in different people: it can be mild, depending on the protective reactions of the organism (local people develop an immunity due to repeated malaria infections and, therefore, malaria normally takes a milder course in them than in the newcomers).

Irregular use of anti-malarial drugs as protection can delay the onset of the disease and mask its course. In case of a rise in body temperature in the tropics, or after returning home, it is necessary to consult a doctor and take a blood analysis for malaria parasites. With timely treatment the patient recovers in a few days.

Preventive measures against malaria are important

both to protect individual health and to prevent the spread of malaria by infected persons returning to their homelands.

We have already discussed the means of protection against mosquitoes. It must be borne in mind that people who stay in the tropics for months cannot avoid being bitten by mosquitoes. Protection against mosquitoes must be supplemented by the regular use of anti-malarial medicines, a compulsory prophylactic measure. A permanently maintained level of anti-malarial drugs in the blood, harmless to the organism, prevents the development of malaria parasites should they be injected with the saliva of an infected mosquito.

The most effective recommended anti-malarial drugs are as follows:

Chloroquine (Aralen, Avloclor, Resochin);

Chloridin (Daraprim, Malocide, Pyrimethamine);

Bigumal (Chlorguanide, Paludrine, Praguanil hydrochloride);

Amodiaquine (Camoquine, Flavoquine).

These medicines, in tablets or syrup (for children), are available at the chemist's. Chloroquine is the best anti-malarial drug, though it is ineffective in areas where chloroquine-resistant strains of malaria parasites exist. The specific drug and its dosage for prophylactic purposes should be selected by a doctor according to the spread of malaria in the area, the parasite species, and the degree of risk of infection in the area. Since dosages for children depend on body weight and general health, parents should consult the doctor as to the prophylactic dosages of anti-malarial medicines for their children. Anti-malarial drugs must be taken regularly; lapses interrupt the protective effect. In tropical areas where

malignant malaria is widespread (in tropical Africa) adults should take a tablet of chloroquine (drug content 0.1 per tablet) or one to two tablets of bigumal (drug content 0.1 per tablet) daily after the meal. Nearly all anti-malarial drugs are prescribed even in pregnancy. Newcomers should begin to take anti-malarial medicines for prophylactic purposes immediately upon arrival in an infected area and continue to take them throughout their stay and for a month after departure. This measure guarantees individual protection against malaria and prevents export of the disease.

Strains of drug-resistant malaria parasites are found in a number of countries (Panama, Brazil, Colombia, Equador, Guyana, Surinam, Venezuela, Bangladesh, Kampuchea, India, Indonesia, Laos, Malysia, Nepal, Papua-New Guinea, the Philippines, Thailand, Vietnam). In these countries the doctor may recommend pyrimethamine in combination with sulfamides for a short time. Information concerning drug-resistant strains of malaria parasites can be obtained from the local representative of the World Health Organization (WHO). After returning home remember that any rise of temperature may indicate malaria. To facilitate diagnosis and treatment, the doctor should be informed that you have recently returned from the tropics.

MARSEILLES FEVER

Marseilles fever (African tick typhus, Kenya tick typhus) is widespread in the tropics. Infection occurs through the bite of a tick or through contamination of wound or scratches on the skin or of the mucous membranes of the mouth and eyes by the fluid of ticks that are

accidentally crushed when removed from the cattle or dogs. Newcomers to the tropics, mainly those working on farms, sometimes fall ill with marseilles fever.

A small ulcer (2 to 5 mm in diameter), black in the centre with a red rim develops at the site of the tick's bite. The disease is accompanied with chills, elevation of temperature to 40°C, headache, pains in the muscles and joints. On the fourth or fifth day of the disease, a skin rash appears on the body and hands and stays for six to seven days. The duration of the disease can vary from several days to two weeks. In the tropics the disease is transmitted all year round. It is very rarely fatal.

Prophylaxis involves protection of man from ticks and extermination of ticks on domestic animals, near human dwellings, and in pastures. Visits to tick-infested areas should be limited. Ticks adhered to man or animals must be removed carefully, so as not to crush them or contaminate the hands. The socks and trousers should be impregnated with repellents.

MYIASES

In the tropics myiases are common both in the local population and in the newcomers. Myiases are caused by the maggots of flies and gadflies, which live as parasites, in the tissues. The maggots and eggs can be accidentally ingested with food, laid on the hair, skin, wounds or mucous membranes, or passed to man from the hair of animals, sand, grass, bedclothes or underwear, and so on. The course of the disease depends on the species of the larvae and the organs it is parasitizing. The myiases can pass quickly, doing little harm, or they can cause considerable destruction of tissues in the human organism.

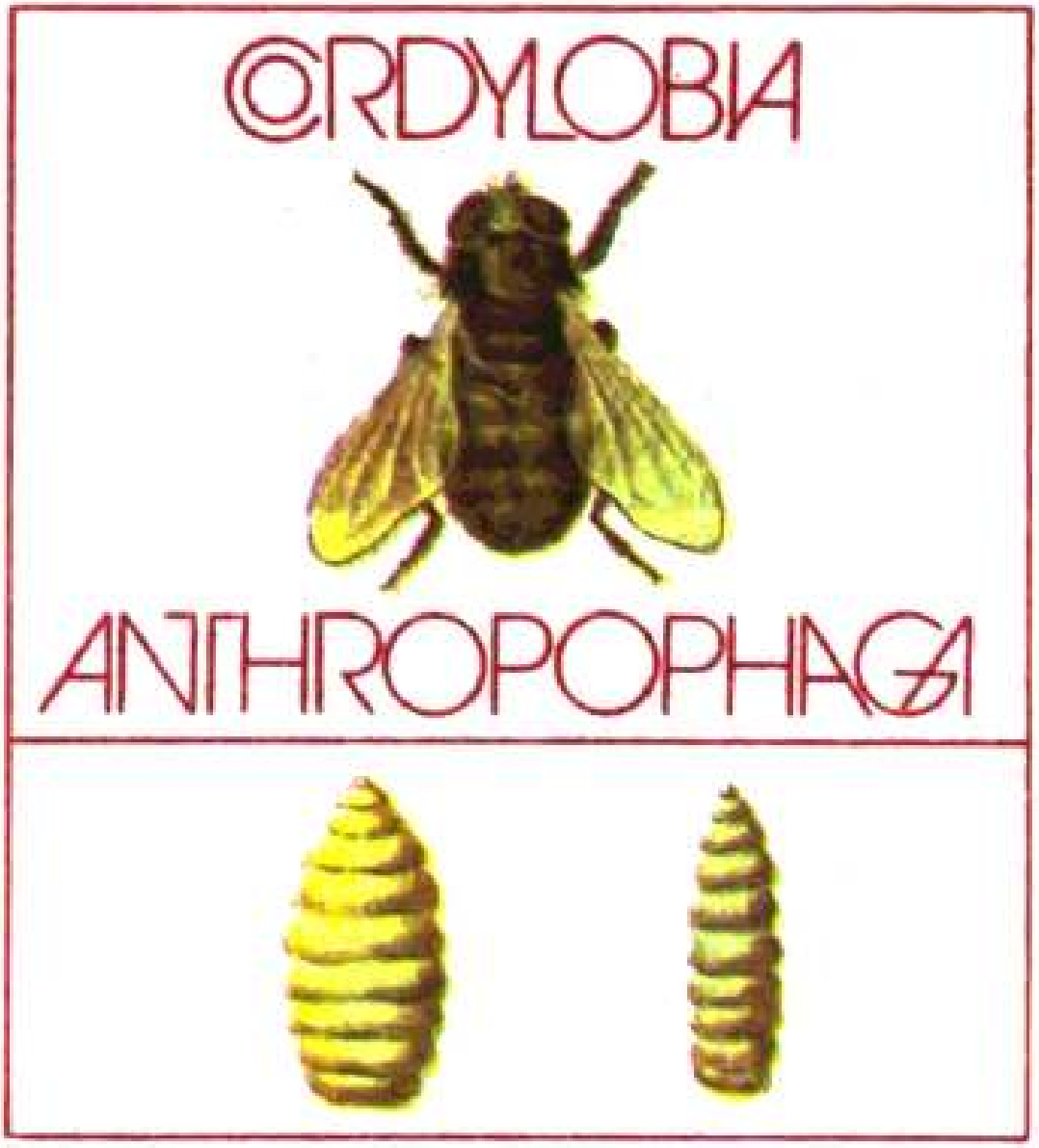


Fig. 19. *Cordylobia anthropophaga* and its maggots – causative agents of myiasis (cordylobiasis)

In Africa the myiasis most common in newcomers is cordylobiasis, which is caused by the maggots of the Cordylobia anthropophaga, the local name is tumbu (Fig. 19). The maggots hatch from eggs which the fly lays on sandy soil and burrow into the skin of persons lying on the sand (for example, on the beach) or on linen that was

Fig. 20. Maggot of *Cordylobia anthropophaga* in the skin (on the head)

spread on the sand for drying. A boil-like swelling develops at the site of penetration (Fig. 20). Within eight to ten days the maggot completes its development cycle and emerges through the skin. This myiasis is not dangerous. The maggots are withdrawn with tweezers, and the wound is bandaged.

The maggots of another fly, known in Central Africa as the Congo floor maggot, are laid in the dust in adobe houses. The maggots suck blood at night, and leave skin lesions on people sleeping on the floor.

In the tropics and subtropics, particularly in cattle-breeding areas, various forms of myiases are found in man, such as ophthalmomyiases, which is caused by the maggots of the Wohlfahrtia fly, ox warble fly, breeze fly,

and other species parasitizing the eye. Maggots laid on the eyelids and in the corner of the eye penetrate the conjunctival sac, the eyelids of the eyelash and cause watering of the eyes, pain, swelling and crawling of the eyelids, and eyesight disturbances. These myiases can be very serious in children.

To protect against myiases newcomers should follow general sanitary practices in combatting the flies and keeping the house, surrounding territory, beaches, and cattle-breeding farms clean (timely removal and disinfection of garbage, use of insecticides, and so on). Also important are individual means of protection against flies and their eggs and maggots. In the tropics it is not recommended to lie on the floor, ground, or grass without a mat. Do not walk barefooted or use poorly organized beaches. Mats, bed linen and underwear should be washed with soap and ironed daily and should not be dried on the sand. Fresh wounds and scratches should be treated with medical preparations (iodine, antibiotics, brilliant green) and bandaged. Should lesions (boil-like swellings, nodules, and so on) appear on the skin or the eye, a doctor must be consulted. Visits to pastures and cattle-breeding farms should be avoided, if possible.

PARAGONIMIASIS

Paragoniminasis is a worm disease caused by paragonimus parasites widespread in China, Japan, Indo-China, and the Philippine Islands, and also found in South America and Africa. Humans may contract the disease by eating raw or poorly cooked crabs infested with the larvae of the *paragonimus* (Fig. 21). Symptoms

Fig. 21. Crabs, intermediate hosts of the causative agents of paragonimiasis

appear six weeks after consuming the larvae and depend on the organ affected (the lungs, brain, urino-genital organs). Lesions on the lungs are accompanied by shortness of breath, fever, and a cough with mucous containing blood and the paragonimus ova.

Paragonimiasis can be prevented by thoroughly cooking all crabs and crawfish, which must on no account be eaten raw. It is wise to avoid bars and restaurants with poor sanitary conditions since the disease can be trans-

mitted through poorly washed hands, dishes, or cutlery used in the preparation of the crabs.

The phlegm, excrement, and urine of victims of paragonimiasis must be disinfected.

SARCOPSYLLOSIS

Sarcopsyllosis is a skin disease of the feet, quite common in the tropics, especially in Africa. It is caused by the sand flea (beach flea) which differs only slightly from the common flea.

The female flea burrows into the skin of the feet (usually under the nails), grows to the size of a pea, and dies there, causing itching, pain, inflammation, and oedema; ulceration also frequently occurs. The flea must be carefully withdrawn with tweezers and the wound bandaged.

Prophylaxis is provided through control of the fleas and protection from their bites. Shoes and socks should be worn at all times.

FILARIASIS

In tropical and subtropical countries worm diseases can be transmitted through the bites of some species of bloodsucking insects (mosquitoes, biting midges, black flies, gadflies). The larvae of the worms enter the blood stream with the bite of the insect and cause various lesions in the organs and tissues of man. The principal filariasis diseases affecting man are onchocerciasis, wuchereriasis, loaiasis, brugiasis, acanthocheilonemiasis, and mansonelliasis. The first three are particularly serious in man.

Onchocerciasis is transmitted by the black flies in tro-

Fig. 22. Black midge, carrier of onchocerciasis

pical Africa and in certain countries of Central and South America (Brazil, Venezuela, Guatemala, and others) (Fig. 22). This disease, widespread among the local population, is also known as river blindness because it can cause eye lesions or blindness and because the midges are most common near rivers. Typical of the disease are firm, movable nodules, ranging in size from a pea to an egg, which form under the skin. Itching, coarsening of the skin, and fever are other common symptoms.

Wuchereriasis is more widespread in the tropics and subtropics than onchocerciasis. The larvae of the worm transmitted by mosquitoes penetrate the skin and inhabit the lymph nodes (mainly the inguinal nodes), causing fever, inflammation of the lymph vessels, and, years

later, thickening (elephantiasis) of the lower extremities, scrotum, mammary glands, and so on.

Loaiasis is transmitted by the gadfly and is found in Western and Central Africa. Loaiasis is also known as 'Calabar swelling' because it is accompanied by painful swellings on the skin which are hot to the touch.

People travelling to tropical countries should know that filariases are not fatal, although they are chronic and slow to develop. Symptoms sometimes take months or years to develop and may appear long after the traveller returns from the tropics. If the number of worms in the organism is small, the disease can take an atypical course, with the development of mild allergic symptoms (slight rises in body temperature, itching and swelling of the skin) or other mild and indefinite symptoms. In such cases the disease can be properly diagnosed only if the doctor knows the length of the stay and place of residence in the tropics and has information about possible contacts with carriers of the disease. The same information is important in diagnosing and treating other tropical diseases, especially rare and little known ones.

Travellers should be examined for filariasis upon returning from the tropics.

The main method of prevention of filariasis is protection against the bites of bloodsucking insects and extermination of the insects in and around the human dwellings. Residents of the tropics should have periodical blood analyses to check for the parasites and ensure early detection and treatment of the disease.

Medicines for prevention of filariasis should be used only under a doctor's supervision, since the drugs for treatment and prophylaxis of the disease are likely to cause side effects.

CHOLERA
AND OTHER INTESTINAL INFECTIONS

The swift spread of the cholera epidemic throughout the tropics (especially Africa) in 1970 and 1971 underlines the need for all travellers to tropical countries to strictly observe the individual methods for prevention of cholera and other intestinal infections (typhus, paratyphoid, bacterial dysentery, poliomyelitis and others). Such infections are transmitted by flies, contaminated hands, food and water.

Since clinical symptoms of cholera can be very mild or completely absent a seemingly 'healthy' person can be the cause of infection. In somewhat more serious cases of the disease dehydration can occur as the result of diarrhoea and vomiting. Convulsions and loss of consciousness may also occur.

Measures for the prevention of cholera are especially important in countries where epidemics have occurred recently (Indonesia, Malaysia, the Philippines, Burma, Thailand, India, Pakistan, Afghanistan, Iran, the countries of tropical Africa, and others) since the disease cannot be quickly eradicated in vast territories and has a tendency to persist, for a certain period, after the outbreak of the epidemic.

Sanitation in the tropics may be unsatisfactory and the quality of water and food products, or the cleanliness of bars, restaurants, and shops is often unreliable. Newcomers to the tropics, therefore, must provide sanitary conditions at home to protect the family from intestinal infections. The kitchen, glassware, cutlery should be clean, and food prepared under sanitary conditions. All

Fig. 23. Snail, intermediate host of schistosomiasis

water must be boiled. It is important to control the flies and to observe the rules of individual hygiene.

People travelling to or living in countries with cholera are vaccinated against cholera. The vaccination certificate is valid for six months from the day of vaccination. The vaccination is repeated if necessary.

The prevention of cholera and other intestinal diseases is important both to ensure the preservation of individual health and to prevent the spread of disease from country to country.

Fig. 24. Cercaria

SCHISTOSOMIASIS

Schistosomiases are worm diseases widespread in Africa, Asia and Central and South America. Nearly 200 million people in the world suffer from these diseases. People travelling to the tropics from more temperate climates quite frequently fall ill with one or another form of schistosomiasis.

Schistosomiases are caused by worms (schistosoms) with a complex cycle of development. The worms, ranging in length from 4 to 26 millimetres, live as parasites in the human blood stream. Fertilized females deposit ova that penetrate the walls of the blood vessels and emerge into the intestinal tract (intestinal schistosomiasis) or the urinary bladder (vesical schistosomiasis). The ova may then enter the public water supply when they are voided with the urine or stool. Upon contacting water the larvae hatch from the ova and penetrate into snails (molluscs, Fig. 23) and there develop into cercariae (Fig. 24). The cercariae then leave the snail hosts and can burrow into

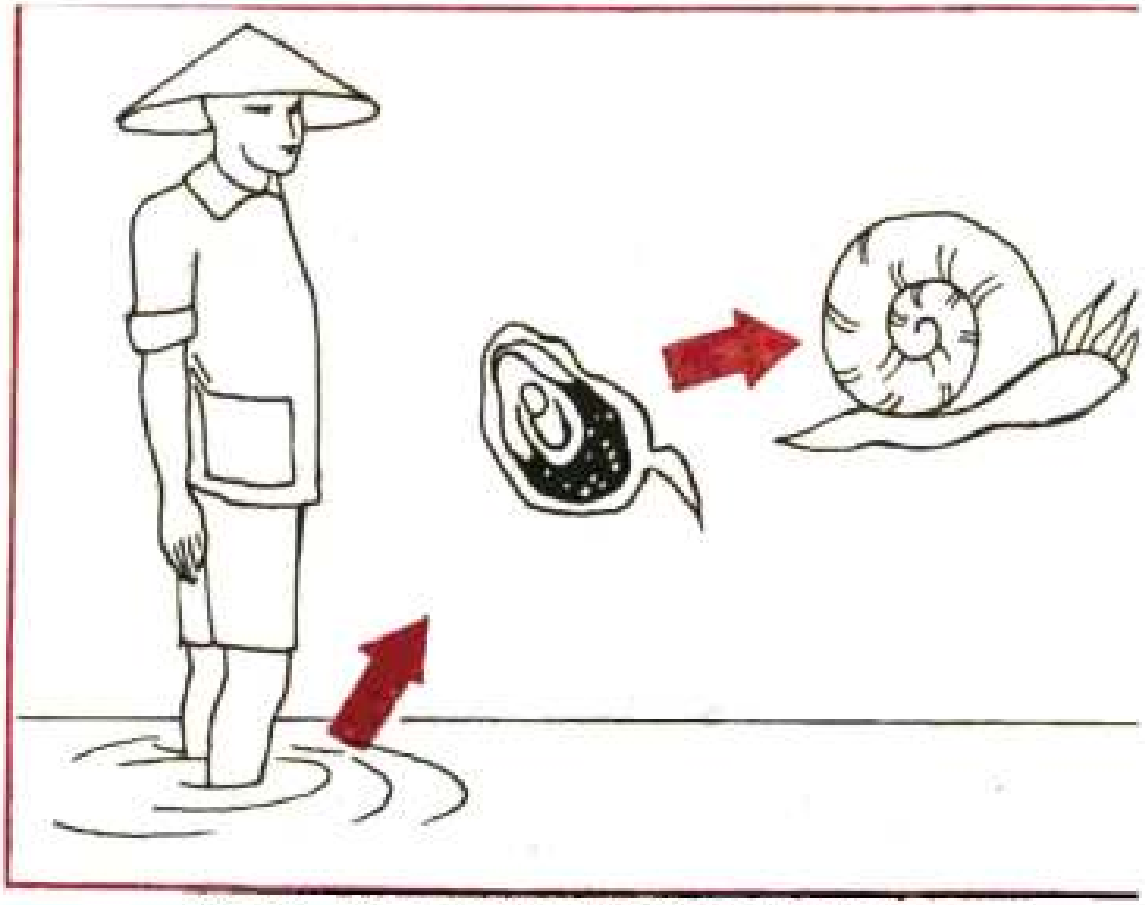
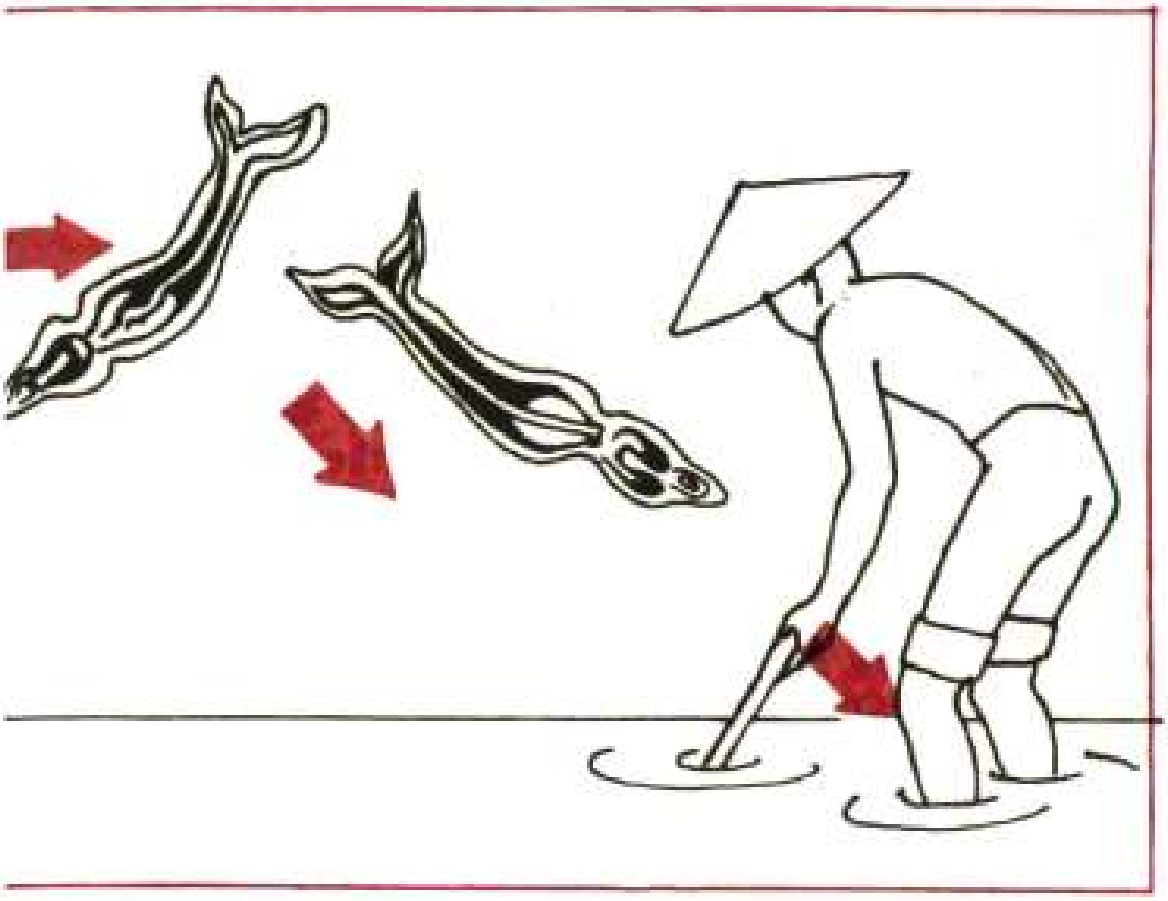


Fig. 25. Transmission of schistosomiasis

the skin of humans swimming or working in infested water (Fig. 25).

Schistosomiasis is characterized by skin itching at the site of penetration of the parasite, fever, painful, frequent, and bloody bowel or urination. Sometimes the disease takes a mild course.

Travellers returning from the tropics should be examined for schistosomiasis. While in the tropics newcomers must pay particular attention to the prevention of schistosomiasis. Swimming in rivers or streams should be avoided, no matter how tempting the prospect, although swimming in the sea or ocean, far away from



the river mouth, is possible. Swimming pools with poor sanitation should also be avoided. It is dangerous to walk barefooted near reservoirs on damp grass, to bathe or to wash clothes in reservoirs or canals, or to work in reservoirs or canals without protective outer garments. Purified water should be used for cooking and drinking. Schistosomiasis is a disease which is easier to prevent than to cure. In case of contact with contaminated water, dry the skin thoroughly and change clothes. When working in water use protective outer garments and repellent. Periodic analyses of the urine and stool can ensure timely diagnosis and treatment of the disease.

PLAGUE

Plague carried by wild rodents (and subsequently transmitted to humans by fleas) is found in a number of tropical areas (South America, Central and South-Western Asia, Central and Southern Africa). Modern means of combatting the plague have practically eliminated human epidemics of the disease.

Persons working in areas where plague has been a problem should obtain information from the local medical officer about recent incidence of the disease. Personal hygiene is important, and protective outer garments and underwear impregnated with insecticides and repellents should be worn. Individuals may be vaccinated on the recommendation of a doctor. Vaccination against plague is effective for six to twelve months from the second week after inoculation.

Working and Living Conditions in the Tropics

Health in the tropics depends on protection from the wearing effects of the climate, and from carriers of disease. Equally important, however, is the creation of a proper living conditions. Work, rest, diet, and personal hygiene require special attention.

DAILY ROUTINE

The proper daily routine depends on the official work day for each country. It is usually best to get up at 6 or 7 a. m. and to exercise for 20 to 30 minutes before taking shower. In many tropical countries work begins at 8 a. m. with a break of 2 or 3 hours at midday (from 12 to 2 p. m. or 3 p. m.). After lunch it is best to rest in a cool room. Physical labour, in particular, is not recommended immediately after meals. If the intermission lasts longer than two hours, it is advisable to take a short nap in bed.

Immediately after work (usually at 5 or 6 p. m. or earlier), it is a good idea to have tea. The time before supper

can be devoted to sports, games, or similar recreational activities. It is best to retire around 9 or 10 p.m.

The same routine should be observed on days off. House work should be done in the cool morning hours or in the afternoon.

WORK

Manual labour and sedentary work are as necessary in the tropics for man as they are in temperate climates. The daily routine depends on local conditions. As a rule, work is done in the coolest hours of the day, the morning and the evening.

Work in the tropics may be either indoor, sedentary work, usually performed in air-conditioned offices, or heavy physical labour of construction workers, geologists, and so on, performed outdoor. In either case it is important to observe the following recommendations:

– physical activity during the period of acclimatization (namely, in the first months after arrival) should be moderate and controlled by a doctor;

– when working in the open, take a long break during the hottest hours of the day and take a nap in an air-conditioned room if possible; every hour of work should be followed by a ten or fifteen-minute break;

– while performing manual labour drink plenty of liquids to compensate for excessive perspiration;

– roadbuilders, lumberjacks, geologists, construction workers, agronomists, and others engaged in similar activities should be provided with protective outer garments suitable for tropical conditions;

– persons engaged in sedentary work should exercise daily; long walks will help maintain a normal physical condition and ensure sound sleep and a good appetite.

Chauffers, excavator operators, and certain other specialists should use detachable netted seat covers to improve air circulation.

Working conditions in the tropics can be improved by mechanization of labour where possible and by air conditioning. Recreational facilities and shower rooms, equipped with medicine chests should be provided. The health of the workers, the condition of their protective outer garments, and the sanitation of the working stations should be checked periodically by medical personnel.

REST

Proper use of leisure time is especially important in preserving health, and newcomers should establish an appropriate everyday routine that includes time for recreation as soon as they arrive in the tropics.

Sleep, morning exercises, rest during the day, walks in the evening, trips to the country, and sports and recreational activities should be part of a regular and fixed regime. Such activities are invigorating after a day's work.

A good night's sleep is necessary from the very first days in the tropics since a hot climate puts a greater strain on the nervous system than a temperate climate. On hot and sultry nights use a ventilator or air conditioner. To avoid chills direct the air stream away from sleeping persons. It is good to go to bed rather early, especially during the hot season or when particularly tired at the end of the day. A nap in bed is recommended during the dinner break, although the nap in the daytime should not affect the number of hours slept at night. The

adult should sleep no less than 8 hours at night in the tropics.

Sports activities are recommended, although they should be moderate during the first weeks after arrival when resistance to the adverse impact of the tropical climate is low. Untrained persons should consult a doctor about the duration of sports activities to avoid the disturbances of the water and salt metabolism. Sports activities are usually reserved for the evening; they should not cause overtiredness. Light cotton clothes, which should be changed daily, are best for sports activities.

Swimming in the sea or the ocean or in uncontaminated swimming pools free of poisonous dangerous animals can be most refreshing. Large hotels are usually equipped with swimming pools which function during the hot season and which are acceptable places of recreation provided the following regulations are observed:

– sunbathing should be restricted to 10-20 minutes a day to prevent sunburns. Between swims it is better to stay in the shade of a beach umbrella, tree, or tent (the ultraviolet rays will still reach you there);

– dry off with a clean towel and use a clean and dry straw or linen mat to lie on;

– after swimming and showering the feet should be dusted with prophylactic fungicidal powder.

Trips to the country on days off can be relaxing if the route is well chosen. Be careful to avoid overtiredness, overheating, or exposure to disease. At least every two years take a trip home for a longer holiday (two or more months). It is best to take the holiday in the late spring, summer, or early autumn to avoid sharp temperature differences.

LIVING QUARTERS

In the tropics, just as in any other region of the world, a house is meant to provide protection against sharp temperature drops, wind, humidity, rain, sun, insects, and animals.

Newcomers to the tropics usually settle in hotels, bungalows, flats, or, if they are working in the field, in tents. Each type of dwelling has certain advantages and shortcomings. All of them, however, must meet certain requirements, provide a comfortable microclimate, and offer protection from carriers of disease. Health, to a great extent, depends on consistent observance of the simple rules of hygiene, particularly in the living and auxiliary quarters, as well as the surrounding territory.

A comfortable microclimate in the living quarters depends on a variety of factors. Houses with overhanging cornices and verandahs surrounded by trees are better protected from the rays of the sun. The roof and walls of the house should be painted a light colour to reflect the rays. The windows should be provided with venetian blinds or curtains. In hot and humid regions buildings can be aerated by opening opposing doors and windows to catch the prevailing breezes. Electric fans and air conditioners are widely used in the tropics to provide a comfortable atmosphere and ventilation inside the house. Air conditioners ensure a good night's sleep and prevent skin diseases caused by excessive perspiration. The room must be kept sealed while the air conditioner is in use. Unfortunately, air conditioners can be used only in towns where electricity is available and repair shops can be found.

The floors of the living quarters should be washed with

soap and water or disinfectant (preferably without an irritating smell); the walls, furniture, windows, paintings, and other articles should be dusted daily. Special polishes, available in the local shops, will protect the floors and furniture from mildew and insects. Carpets on the floors or wall are not recommended since the carpets collect insects.

The kitchen must be kept immaculate. Wash the tables before and after use. In homes without indoor plumbing water should be kept in tanks with lids and changed regularly. The kitchen ovens may vary in design; the most convenient and modern are electric and gas ovens. The oven should be accessible from all sides to facilitate cleaning. A refrigerator is a necessity in the tropics. It should be installed in a cool place and its contents checked daily. Once a week empty the refrigerator and wash it thoroughly.

It is important, of course, to keep the lavatory and bathroom clean. A shower is preferable to a bath in the tropics since the water in the shower is constantly changing.

To keep the living quarters free from insects and poisonous animals, all windows and doors should be fitted with metal or nylon-gauze screens. Cracks and splits should be sealed. The bed should be provided with bed netting or bed curtains (Fig. 26). The netting is rolled up in the day time, and let down again before going to bed. The edges should be tucked completely under the mattress. The netting must be checked regularly for holes. Anti-mosquito insecticides should always be kept at hand in the bedroom, and the walls, ceiling, and nettings treated with insecticide regularly. In regions with vast numbers of insects treatment should be daily.

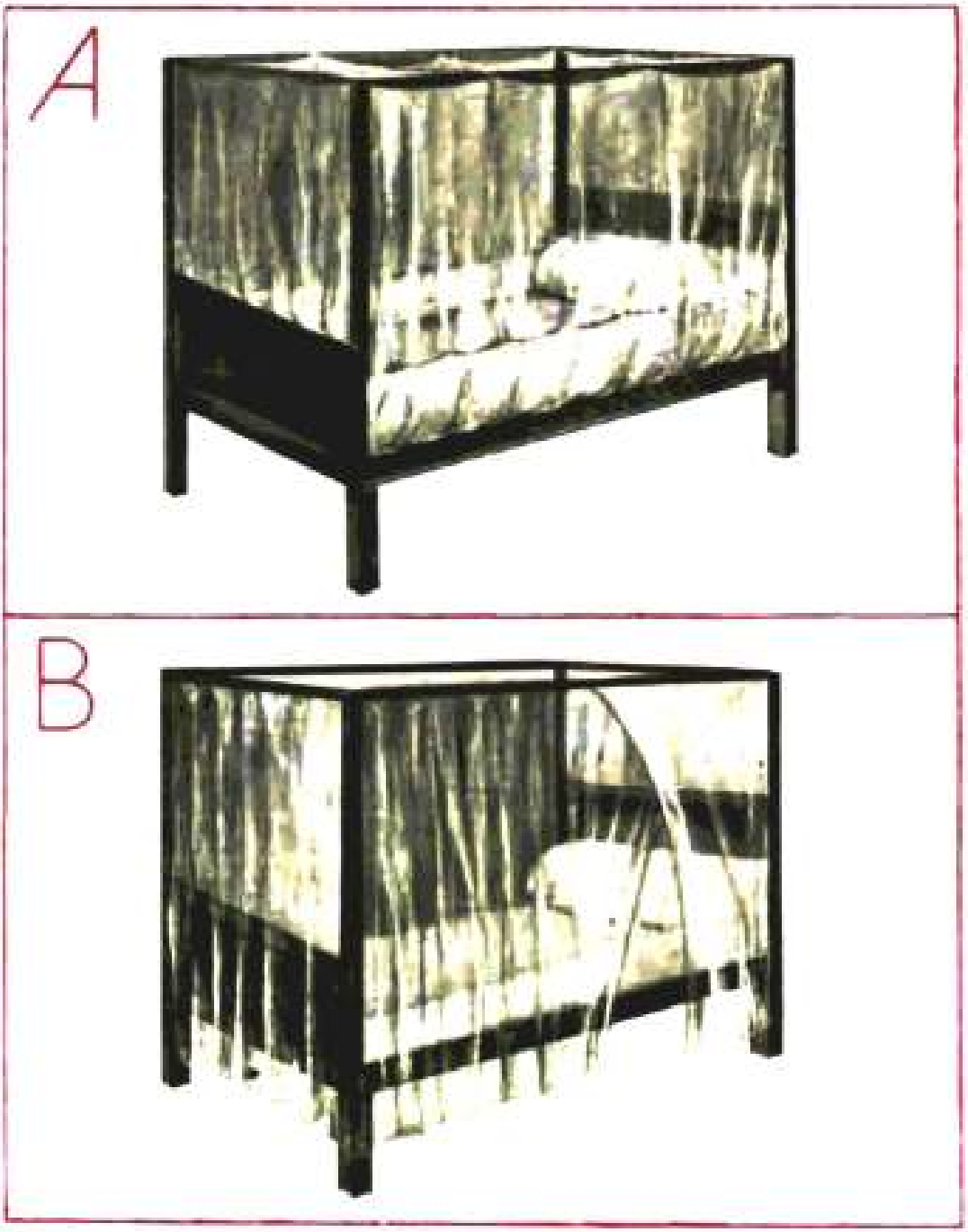


Fig. 26. Bed netting: *a* – correct; *b* – incorrect

The area around the house must also be kept clean and tidy. Nests of rodents or snakes and breeding grounds for flies, mosquitoes, and other insects must be eradicated. Garbage in towns should be kept in metal bins with closely fitting lids to prevent pilfering by hyenas, dogs, and cats. In the country garbage should be collected in a pit as far from the house as possible and burned and buried daily to prevent flies from breeding and to avoid attracting dogs and hyenas. Water reservoirs and ditches around the house should be dried and grass around the house cut short. Cans or tanks with water must never be left lying around since they quickly become breeding grounds for mosquitoes.

In the country sanitary conditions in the outbuildings (sheds, latrines, cattle-yards) may have a direct effect on the health of the human population. After dark approaches to these facilities must be illuminated to prevent the bites of snakes and ants. The grass around these facilities should be cut short. Pits containing sewage and manure must be kept firmly closed and emptied regularly. It is good practice to keep soap, towels, water, a box with dry earth (to cover up the sewage) and insecticides in the latrines. The walls should be treated against mosquitoes. After dark a flashlight is essential.

CLOTHES

From the medical point of view, clothes in the tropics are extremely important. Clothes should be selected to suit the climate of the country and the nature of the work to be performed. Clothes for work in office, in the jungle, in the desert, underground, or on board a ship differ significantly. For work in the savanna or in the jungle, thick

clothes are needed to provide protection from the sun, poisonous insects, and animals; sailors need lighter clothes. Some professions require special protective outer wear, which may need particular care (outlined in the relevant instructions). Whatever clothes are used in the tropics, they must offer reliable protection from the sun and insects, allow the free passage of air, absorb perspiration.

Light-coloured clothes of linen, cotton or mixed fibers (linen and synthetic) are best for the tropics. They should be loose, light, comfortable, and easy to wash, dry, and iron. Loose, permanent-press dresses and underwear are recommended for women. A woollen jacket, a light coat, or a cotton raincoat is necessary in the cool season. Blouses with long sleeves and trousers can be worn in the evening for protection against insects.

Men will need underwear, shirts with long sleeves, and trousers. Shorts and shirts with short sleeves can be worn in the daytime only in regions where solar radiation is moderate and the number of insects is small. In the cool season warm clothing (a woollen suit, sweater, or coat) is necessary. Cotton socks are preferable, although nylon socks can also be worn. A light cloth or straw hat will protect the head and neck from the sun's rays. Tropical (cork) helmets also provide good protection against the sun but they are not available today.

Properly chosen footwear can guard against fungous diseases, snakes, scorpions, sand fleas, leeches, certain worm species, and so on. Tennis shoes are comfortable and practical. In towns sandals and socks can be worn during the dry season. It is inadvisable to go barefooted even in the house. People working in water should wear rubber boots as should children during the rainy season.

Proper care of the clothes is important in the tropics. Underwear and socks should be washed, boiled, and ironed daily to exterminate carriers of various diseases. Street clothes must also be frequently changed (2 or 3 times a week). Footwear should be checked for scorpions before wearing. To prevent mildew, clothes and footwear must be regularly aerated and kept in wardrobes or nylon sacks with several naphthalene tablets.

PERSONAL HYGIENE

In the tropics the rules of personal hygiene must become an integral part of the daily routine, as important as work, diet, and rest. Care of the skin is a daily affair. It is a good idea to shower twice a day (in the morning and evening) with mild soap that will not irritate the skin. Only water from reliable, uncontaminated sources should be used for bathing. The teeth must be brushed and the mouth rinsed with boiled water only.

Natural water reservoirs are dangerous not only because of possible contamination with the causative agents of disease but also because of the presence of snakes, crocodiles, and poisonous and dangerous fish and animals. Even sea water near the mouths of a river can be contaminated. Bathing and swimming in natural reservoirs is risky except in places especially reserved for bathing and recommended by a doctor.

After showering or bathing the body should be dried with a clean towel. A separate towel should be used to dry the feet, and the towels should be changed daily. The armpits, groin, and the skin between the toes should be talced. Eau-de-Cologne freshens and dries the skin. After showering in public showers dust the feet with prophy-

lactic fungicidal powder. The hands should be washed with soap before meals and after using the lavatory to avoid contamination.

Hair should be cut often, although the services of street barbers should be avoided.

In the tropics the eyes must be properly protected from the effects of the sun and the dry, sandy and dusty winds. Although the vegetation provides relief for the eyes, in towns where the buildings are painted white or yellow or in arid regions, the eyes may be strained from the bright sunlight. Wear moderately dark glasses to protect the eyes from the sun.

WATER PURIFICATION

In the tropics water sources are often contaminated with the causative agents of various diseases. Since indoor plumbing is rare, especially in the country, the environment (the soil, reservoirs, and so on) may be contaminated with the causative agents of various diseases (typhus, paratyphoid, dysentery, cholera, and other diseases). Decontamination and purification of the water sources may prevent the spread of these diseases.

Unfortunately, local public health authorities often fail to provide adequate purification and decontamination of water in the tropics even in urban areas. Newcomers should take these facts into account and purify water for everyday needs themselves. The water can be boiled, filtered, or decontaminated chemically. Drinks other than water (juice, lemonade, mineral water, tea, coffee, cocoa, milk, beer, wine, and so on) are safe only if sterilized and served in clean glasses. Be certain the drinks are not contaminated before drinking, and in

hotels, bars, coffee houses, and street kiosks, buy only drinks bottled in state factories.

The basic methods for water purification are boiling, filtering, and chemical disinfection. *Boiling* is the most reliable way of destroying all causative agents of diseases (bacteria, parasitic worms, ova, spores, cysts). The water must be brought to a 'rolling' boil and kept boiling for several minutes.

Filtration is also an effective method of water purification, although it does not guarantee complete decontamination. Filters of various designs are commercially available. They may be macroporous or microporous, ceramic or porcelain. Filters with silver and without it are also available, as are filters for large stationary filtering installations and for portable ones. Portable porcelain candle filters of medium porosity, built into three to five litre water tanks, are suitable for domestic needs. The filters should be regularly and thoroughly examined for cracks and other damages which might let in unfiltered water. The filter should be scrubbed weekly with a stiff brush under running water and boiled for five to ten minutes.

In the field, *water can be purified chemically* with tablets containing chlorine or iodine ('Sterotabs', 'Potable Aqua', etc.). Normal dosage is one tablet per one litre of water. A simple method of purification is to add two drops of 5 per cent iodine solution to a litre of water. Chlorine in tablet form is a good disinfectant, effective against the causative agents of gastrointestinal, waterborne diseases, although in normal doses it is ineffective against the cysts of dysentery amoebae, the ova of parasitic worms or microbes embedded in large particles. In

such cases iodine tablets are more effective, although boiling is still the most reliable method of disinfection.

Drinks should be prepared with purified water since neither carbonation nor addition of alcohol (gin, whisky, and so on) sterilizes the water. Ice should also be prepared from purified water. Boiled, filtered, or decontaminated water and drinks must be kept in clean bottles in the refrigerators; if a refrigerator is not available, the bottles should be screwed or corked and kept in a cool place under a damp cloth. In the field special flasks or large water containers can be used.

WATER AND THE DRINKING CYCLE

In the tropics even the slightest thirst must be quenched. It is good to drink as much water or juice as desired, although this may cause excessive perspiration. Such a practice helps maintain the water balance in the organism and ensures general well-being.

Boiled water, fruit juices, and tea make excellent drinks, and natural fruit juice diluted with carbonated or boiled water, ice, and a slice of lemon can be very refreshing. Many people prefer home-made drinks, kept in the refrigerator in bottles. The most popular drinks are made from grapefruit or lemons. The juice of the fruit is diluted in a litre of boiled water to which one or two tablespoonfuls of sugar have been added.

Since salt deficiency as the result of excessive perspiration may cause undue fatiguability or psychic and nervous disorders, it may be necessary to compensate for salt losses by taking salt with food or drinks. Depending on an individual's age and weight, twenty to thirty grams of salt are required daily. Alcohol may also affect the

amount of salt in the organism, and as a result, alcohol is more harmful in the tropics than in more temperate climates: in hot and humid weather alcohol disturbs the organism's water-salt metabolism. Although some authors consider highly diluted alcoholic drinks in the evening harmless, the author of this publication does not share this opinion. Alcohol, in any concentration is a narcotic, and thus damaging to the health. A healthy everyday routine helps in acclimatization, and maintenance of the neuropsychic balance and enhances the body's resistance to disease. It is better, therefore, to abstain from both alcohol and tobacco in the tropics.

FOODSTUFFS

Food, contaminated with bacteria, cysts, or the eggs of parasitic worms is, along with contaminated water, one of the main sources of food poisoning, dysentery, typhoid, worm infestations, and other diseases. From their very first days in the tropics, newcomers should watch their diet carefully paying special attention to the quality, preparation, cooking, and storage of the food they eat.

During the initial period of their stay in the tropics many people have their meals at hotel restaurants where traditional dishes, including raw or partly cooked food, are served. Since underdone beef or pork may be the source of tapeworm infestation (beef or armed tapeworm), the waiter should be asked to have these dishes well cooked. Raw crabs, which may be the source of paragonimiasis, should be completely avoided. National dishes cooked in the traditional way are pungent because of such ingredients as tomatoes, pepper, and other sea-

sonings and spices. Such dishes are appetizing, but, if eaten too frequently may cause liver and intestinal diseases. Green salads, which may have been fertilized with human waste, as is frequently the case in the tropics, and then poorly washed should not be ordered, and it is best not to buy pastries, cakes, or soft cheeses. Local food (pasties, sandwiches, shashliks, and so on etc.) should not be purchased from street peddlers. People who cook their meals at home buy their food at the local market, in local shops, or from peddlers. In the tropics both local and imported foodstuffs are available, and, although the products will be unfamiliar to newcomers, on the whole the assortment of foodstuffs is the same as that found in temperate countries. Food should be carried home from the shop or market in an easily washed and dried wicker basket. Plastic bags for meat and fish, a cloth bag for bread, and other containers that are easy to keep clean are also useful.

Since foodstuffs spoil quickly in the tropics, they should be taken home as soon as possible and either prepared or stored in the refrigerator. Milk must be boiled as soon as possible and kept in the refrigerator. In many tropical countries, condensed or powdered milk is available; it should be diluted with boiled water only. Milk for hot drinks (tea, coffee) must also be boiled.

Meat and fish also rot quickly, they must either be frozen or used within a day or two after purchase.

Sea food, including fish, crab, spiny lobster, shrimp, oysters, and so on is available in many tropical countries. Crab, spiny lobster, and shrimp should be purchased live. They must be washed thoroughly and cooked immediately before the meal to prevent food poisoning. This is especially true of shrimp. In the country, meat is not in-

spected to ensure sanitary requirements. Therefore, it must be stored and cooked with extreme caution. The internal organs (brain, liver, kidneys, lungs, and so on) should not be purchased.

It is important to buy bread at the baker's rather than from street peddlers. Bread can be kept in the freezer for several days and thawed before each meal.

Vegetables should be thoroughly scrubbed with a sponge, clean water with soap or soap powder; the same applies to fruit, including fruit that is peeled before eating (oranges, grapefruit, mango, pineapples, and others). Raw vegetables should be blanched in boiling water, before they are eaten. Potassium permanganate is not reliable enough since it has no effect on microbes and the eggs of parasitic worms. The procedure for cleaning lettuce is as follows: each leaf should be washed with soap, soaked for ten minutes in vinegar solution, and, then, rinsed in distilled water. Foodstuffs not kept in the refrigerator must be protected against rodents and insects. For protection against ants, place the legs of cupboards and sideboards in tins filled with salt water (a tablespoonful of salt per glass of water).

The calorific value of nutrition in the tropics should be 3 to 5 per cent less than normal, but the food should be more varied, richer in vitamins, and attractively garnished. In the hot climate carbohydrates should be consumed in greater amounts especially fruit and berries containing sugar, vitamins, mineral waters, and moisture. Fat should be used more sparingly. The idea that tropical fruits, berries, and vegetables have no dietary value is completely unfounded.

If fresh food (eggs, dairy products, meat, and fruit) is scarce, the diet must be supplemented with vitamins.

Children, sick people, and individuals engaged in heavy manual labour should take vitamins as a matter of course. Normal functioning of the organism in the hot climate depends on food rich in vitamins B, PP, and C.

Local residents occasionally hired as cooks and domestic help should be acquainted with the general rules of sanitation and provided with everything necessary for personal hygiene. Professional cooks should be examined regularly for gastrointestinal infections, tuberculosis, skin disease, and parasites.

Protection of Children's Health in the Tropics

Most children do well in the tropics. Parents, however, should guard their children's health closely and take steps to prevent the contraction of disease.

Babies, for example, should be given frequent drinks. Bottle-fed babies should be fed prepared formula rather than milk from local supplies, which is not dependable as to quality or purity. The formula must be sterilized by boiling. The bottles and nipples must be sterilized after each meal and protected from flies.

The children will be most comfortable in light and loose cotton clothes, which should be regularly washed and ironed. Do not let the children play in the sun without hats. At night and whenever necessary in the daytime, the children need to be protected from insects by nets. Since children tend to scratch insect bite, they should be trained to apply anti-irritant creams (Phenergan, Caladryl, Histofax, and others) instead. Older children can use repellents.

Children should be showed two or three times a day and dried thoroughly. Skin folds and the skin between the toes should be dusted with talc. Use soap as little as possible (especially with babies) since it can cause prickly heat. Children in the tropics must take prophylactic antimalarial drugs regularly. Timely inoculations against children's diseases and other infections are essential.

Prevention of Diseases in the Field

Field expeditions must be planned well in advance, with due consideration for the number of people involved, the duration of the stay, the route, and local conditions. In addition to the inoculations required for each country, inoculations against typhoid and tetanus are recommended before departure.

Individual medicine chests should contain preparations for water purification, extermination of insects, and disinfection of temporary shelters surrounding territory, improvised latrines, and garbage sites.

The camp should be pitched in open country, and utmost attention must be devoted to food storage and garbage disposal (burning, burying), since garbage attracts insects and wild animals. Care should be taken that the general rules of sanitation concerning foodstuffs are strictly observed. Meat and fish should be cooked thoroughly on the day of purchase and, if there is no refrigerator, eaten soon after preparation. Dishes should be washed carefully, dried in the sun, and stored in clean, tightly sealed boxes or plastic bags. Local drinks and milk from local sources are not recommended.

Drinking water must be boiled after settling or filtration, and even water for washing must be boiled if infested.

Swimming or bathing in lakes and rivers infested with

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Drinking water must be boiled after settling or filtration, and even water for washing must be boiled if infested.

Swimming or bathing in lakes and rivers infested with

schistosomiasis should never be attempted. Shelters, bed linen, and clothes must be aired daily. Bed netting must always be used.

The latrine (a covered pit with walls and roof made from shrubs) should be placed far from the water source and camp. After each use, a new layer of earth should be added to the pit, which is then covered tightly.

In the evening a flashlight and repellents are essential.

The doctor, doctor's assistant, or head of the party should supervise the administration of prophylactic antimalarial drugs by all the members of the group.

A Piece of Advice to People Returning from the Tropics

People returning from malarious regions should continue taking anti-malarial drugs for a month as a prophylactic measure. Everyone returning from the tropics, irrespective of the condition of their health, should undergo a medical examination. This will ensure early diagnosis and treatment of apparent or latent tropical diseases.

The doctor should be told the duration and exact region of the stay in the tropics. Other important information concerns the prophylactic measures taken in the tropics and the diseases contracted there. All those returning from the tropics (especially people in poor general health, children, and pregnant women) should be examined in particular for malaria, filariasis, schistosomiasis, ankylostomiasis, and amoibiasis. Individuals who suffer from indisposition of unknown cause two or three years after returning from the tropics should be reexamined.

Biological and Chemical Preparations Used for Protection Against Poisonous Animals and Carriers of Diseases

Preparations	Fleas	Lice	Snakes	Karakurts	Ticks	Mosquitoes	Biting midges	Sand flies	Black flies	Tsetse flies	Leeches	Scorpions	Gadflies
Antivenom (Eng)			+	+									
Serums antivenimeux (Fr)													
Benzyl benzoate					+								
DET (diethyltoluamide)	+	+			+	+	+	+	+	+			+
Dibutyl phthalate					+								
DMP (dimethyl phthalate)		+				+	+	+	+	+	+		+
Elypel						+	+	+	+	+			
Indalone					+	+	+	+	+	+	+		+
N-butylacetamide					+								
Off						+	+	+	+	+			+
Repudine	+				+	+	+	+	+	+			+
Rutgers 612					+						+		
Sketofax						+	+	+	+	+			+
Skeet-o-stick						+	+	+	+	+			

List of Medicines for Individual Medical Chest

1. Acetylsalicylic acid (aspirin)
2. AERON tablets
3. Bandages
4. Boric acid
5. Brilliant green
6. Vaseline
7. Valerian tincture
8. 'Validol'
9. Valocordin
10. Cotton wool
11. Hydrocortisone ointment
12. Dimedrol tablets
13. 5% iodine tincture
14. Zelenin drops
15. Adhesive plaster
16. Potassium permanganate
17. Gauze
18. Ammonia solution (ammonium chloride)
19. Sodium bicarbonate
20. Polyvitamins
21. Fungicidal preparations
22. Anti-malarial medicines
23. Sulphadimesine
24. Talcum powder
25. Tetracycline and tetracycline hydrochloride tablets, coated
26. Thalazole tablets

Persons leaving for the tropics will also need a thermometer, bed netting, tweezers, scissors, pantocide or cholasole (water disinfectants), and various insect repellents.

TO THE READER

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Our address:

Mir Publishers
2 Pervy Rizhsky Pereulok
I-110, GSP, Moscow, 129820
USSR

This publication is a popular account of various preventive measures that will help the reader remain healthy, work efficiently, and live normally in the tropics.

Travellers to the tropics will find information to help them prepare for their trip. Children's health, prevention of the most common tropical diseases, and protection from poisonous plants and animals are other topics discussed at length. The booklet is intended for a wide range of medical specialists, tourists, and local inhabitants, including both temporary and permanent tropical and subtropical dwellers.

The author of the publication, Doctor L. S. Yarotsky, is the deputy director of the Martsinovsky Institute of Medical Parasitology and Tropical Medicine, a division of the USSR Ministry of Health. A well-known and experienced specialist in the field of tropical medicine, Doctor Yarotsky has practiced medicine in Guinea, Egypt, Tanzania, Congo, and other developing countries.

For over a decade Doctor Yarotsky has served as a counsellor to the World Health Organization (Geneva, Switzerland) on the problems of tropical pathology.

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